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Around The World

CONTRIBUTIONS TO A KNOWLEDGE

OF THE

EARTH AND ITS INHABITANTS.

Vol. I.

THE CONTEMPORARY PUBLISHING COMPANY,
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Around the World.

VOL. I. DECEMBER, 1893. NO. I.

OVER THE FROZEN SURFACE OF THE BAY.

A SLEDGE JOURNEY AND AN EXPERIENCE.*

JOSEPHINE DIEBITSCH-PEARY.

HAVING completed our arrangements for a week's exploration of Inglefield Gulf, we started from Redcliffe about noon of the 18th of April with the large dog-sledge, drawn by six dogs and driven by Kyo.

The day was very bright, and the sun shone warm all the time. The traveling as far as Cape Cleveland was good, but then it began to grow heavy, and before we had gone half way across there were places where the dogs sank in to their bellies and almost swam, while we sank down to our knees in a semi-slush ; the sledges, however, went along nicely. Fortunately, there were only a few such places, and as we got near the west end of Herbert Island the ice became smoother and harder, and the dogs sped along, two of us riding at a time, and sometimes all three.

Our sledge reached the west end of Herbert Island at eight o'clock, and two hours later, having crossed over to Northumberland Island, we came upon a cantonment of four snow-igloos. These were occupied by families from different settlements, who congregated here to be near a patch of open water a short distance off, where they caught seal. The largest snow-igloo was occupied by Tahtara, his wife, his father and mother, and some small children (I don't know how many, as they did not sleep there that night). This was put at our disposal; another was occupied by Ikwa and family, together with Kyoshu and his son, while Myah and his wife were accommodated in a third. The mistress of the remaining igloo was making an awful noise and trying to come out of her habitation, while a man was holding her back and talking to her, but she screamed and struggled so long as we remained where she could see us. I asked Mané what was the nature of the trouble, and she told me that the woman was pi-block-to (mad).

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* From Mrs. Peary's "My Arctic Journal." Printed by special permission.

As the wind was blowing fiercely and the air was thick with drifting snow, Mr. Peary urged me to come into the igloo, which I did, rather to please him than to get out of the storm. Now, as long as I have been in this country I have never entered an Eskimo hut; hearing about the filth and vermin was quite enough for me. But Mr. Peary said the snow-house was much cleaner, etc., etc., and seeing that it really made him uncomfortable to have me stay outside, I yielded. Can I ever describe it? First I crawled through a hole and along a passage, about six feet, on my hands and knees; this was level with the snow outside. Then I came to a hole at the end of the passage and in the top of it, which seemed hardly large enough for me to get my head through, and through which I could see numberless legs. Mr. Peary called for me to come, so the legs moved to one side and I wedged myself into the aperture and climbed into a circular place about five feet high, the floor of which, all of snow, was about two feet higher than that of the tunnel. A platform one and a half feet above this floor, and perhaps four feet wide in the middle and two and a half feet at the sides, ran all around the walls of the igloo, except that part in which the aperture or door came up in the floor. The middle of this platform for about five feet was the bed, and it was covered with two or three reindeer skins, which almost crawled away, they were so very much alive. On this bed sat Tahtara's mother, tailor-fashion, with a child on her back; another woman, younger by far, and rather pretty, his wife; and two children, about six and eight years old; and on the edge, with his feet resting on a chunk of walrus, from which some hungry ones helped themselves whenever they wanted to, regardless of the fact that a number of feet had been wiped on it, and that it was not only frozen solid but perfectly raw, sat Tahtara himself, smiling and saying "Yess, yess," to everything Mr. Peary was saying to him. Mr. Peary had also taken a seat on the edge of this bed, and the women immediately made room for me between them; but this was more than I could submit to, so, excusing myself by saying that my clothing was wet from the drifting snow and that I could not think of getting their bedding wet, I sat down, not without a shiver, on the edge beside Mr. Peary, selfishly keeping him between the half-naked women and myself.

The sides of this platform on either side of the doorway were devoted to two large ikkimers (stoves), one of which was tended by Tahtara's mother and the other by his wife. These stoves were very large and filled with chunks of blubber; over each hung a pan made of soapstone containing snow and water, and above these pans were racks or crates fastened very securely, on which the inmates flung their wet kamiks, stockings, mittens, and birdskin shirts. The drippings of dirt, water, and insects fell invariably into the drinking-water. I say "drinking-water;" they have no water for any other purpose. Mr. Peary had put our Florence oil-stove on the side platform and was heating water for our tea. Fortunately, our teapot had a cover on it, which I made my business to keep closed.

Besides the persons mentioned there were always as many "husky" visitors standing as could possibly pack in and not stand on one another. These took turns with those unable to get in, so that after one had been in a while and gazed at the circus, he would lower himself through the trap and make way for a successor among the many crouching in the passageway behind him. This was kept up throughout the night. Of course the addition of our stove, together with the visitors, brought the temperature up rapidly, and to my dismay the Eskimo ladies belonging to the house took off all their clothing except their necklaces of sinishaw, just as unconcernedly as though no one were present.

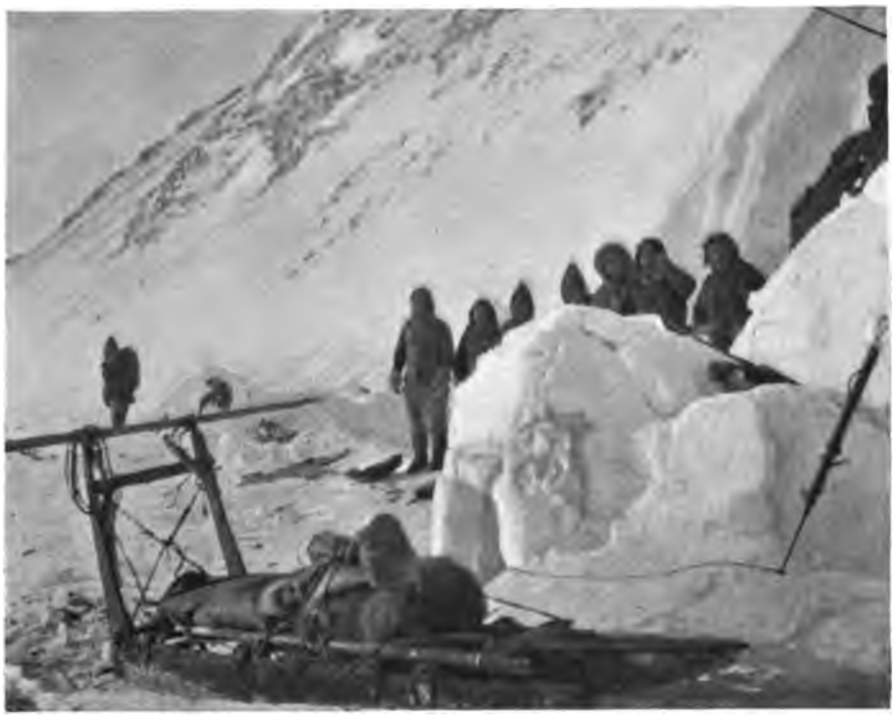
The odor of the place was indescribable. Our stove did not work properly and gave forth a pungent smell of kerosene; the blubber in the other stoves sizzled and sometimes smoked; and the Eskimos—well, suffice it to say there was a decidedly unpleasant atmosphere, in which I spent the night.

I soon found that if I kept my feet on the floor they would freeze, and the only way I could keep them off the floor was to draw up my knees and rest the side of one foot on the edge of the platform and place the other upon it. In this way, and leaning down on my elbow, I sat from ten at night until ten the next morning, dressed just as I was on the sledge. I made the best of the situation, and pretended to Mr. Peary that it was quite a lark.

Mr. Peary went out to look after the dogs several times during the night, and each time reported that the wind was still blowing fiercely and the snow drifting. In the morning the wind had subsided somewhat, and after coffee the dogs were hitched, and we resumed our journey, heading for Keaty.

The traveling was fine, and the dogs took our sledge, with all three of us riding, along at a trot all the way. We arrived at our destination about six P. M., the odometer registering 14.4 miles from Keaty.

Here we found a great many natives, probably sixty, most of whom we had already seen at Redcliffe during the winter. In addition to the regular inhabitants of the place there were a half dozen families from Cape York and its vicinity who were stopping in snow-igloos on their way home from Redcliffe. The winter is their visiting-time, and only during this season do the inhabitants of one place see those of another; they travel for miles and miles over the ice, some with dogs and some without, but there is invariably at least one sledge with every party. This year the travel has been unusually brisk, owing to the American settlement, which all were anxious to visit. Where a family have a sledge and two or three dogs, they load it with a piece of raw walrus or seal (enough to last them from one village to the next), anything and everything that can be scraped together for trade, one or two deerskins for bedding, and the smallest child that has outgrown the mother's hood. The rest of the family then take turns in riding, one at a time, while two push the sledge.



INHABITANTS OF SNOW VILLAGE, NORTHUMBERLAND ISLAND.

On our arrival at the igloos we were immediately surrounded by the natives ; two very old women in particular were led to me, and one of them, putting her face close to mine—much closer than I relished—scrutinized me carefully from head to foot, and then said slowly, "Uwanga sukinuts amishuare, koona immartu ibly takoo nahme," which means, "I have lived a great many suns, but have never seen anything like you."

We had brought our things up to the igloos and intended to get our supper on the hill, but the native odor, together with that of *passé* pussy (seal) and awick (walrus) lying about, was too strong, and I suggested that we return to the sledge. The two old women who first greeted us, despite the fact that they could not walk alone, were determined to accompany us, and they were helped down the hill to the sledge. They looked as old and feeble as women at home do between eighty and eighty-five. Never having seen such a sight, they could not let the chance go by, even at the expense of their little strength. Not being able to carry everything in one trip, I went back for the rest, preferring this to staying with the sledge, where the natives were now swarming, and wanting to handle everything they saw. When I came to the igloos again, Annowee, a Cape York woman, who had lately been to Redcliffe, and who always gesticulates wildly, began to beg me not to go down, but to have Mr. Peary come up to her ; she had "ah-ah" (pain) in her knees and could not possibly make the descent. She wanted to see us as long as she could, as she would never see our like again. All this time she was not only talking loudly, but clutching at my arm whenever I turned to go, and when I said, "Utchow, utchow, wanga tigalay" (Wait, wait : I shall return), she said, "Peeuk," but did not want me to take the things down for fear I would not come back. The other women now closed about me, and all begged me to stay. Mr. Peary, who remained with the sledge, was somewhat disturbed by my position, but it was all done in kindly feeling. In spite of the fact that Annowee "could not come down," she was at the sledge almost as soon as I was.

We had our supper, after which we bartered for tanned oogzook-sinishaw (sealthong), sealskins, bearskin trousers, and two dogs. Old Ahnahna gave me a fine scolding for the benefit of the crowd because I would not give her a needle ; she said Mr. Peary was "peudiochsoa," but "Mittie Peary" was "peeuk nahme"—that I used to give her needles, but now I wouldn't do it, etc., etc. While saying this she was laughing all the time, and when I gave her a cup of tea and a cracker she changed her opinion of me at once.

Mr. Peary walked to the Tyndall Glacier and took photos of it, and of the village and the natives. Kyo then hitched up the dogs, we said good-bye all around, Ikwa included, and at eight o'clock left for Ittiblu.

We had the perfection of traveling. The surface of Whale Sound was just rough enough to prevent it from being slippery, and yet so smooth that the sledge went along as if it were running on a track.

Mr. Peary, Kyo, the driver, and myself were all three seated upon the sledge, which in addition was heavily laden with our sleeping-bags, equipment, provisions, etc., and yet the nine handsome creatures, picked dogs of the tribe, that were pulling us immediately broke into a run, and, with tails waving like plumes over their backs, kept up a brisk gait until we reached Ittiblu at two o'clock in the morning ; the odometer registered 21.94 miles. The night was a beautiful one. The sun shone brightly until near midnight, when he went down like a ball of fire, tinging the sky with crimson, purple, and yellow lights, which gradually faded out and left a dull grayish blue, which in turn changed to a gray just dark enough to show us the numberless stars which studded the firmament. Just as we reached Ittiblu the sun came up from behind the dark cliffs of the eastern shore of Inglefield Gulf. We had been traveling sixteen hours, and were pretty well tired out. Our dogs, too, were glad to have a meal and rest.

We immediately set to work to build a snow-igloo of our own, on the icy floor of which we placed our sleeping-bags and everything that we did not wish handled by the inhabitants of the settlement. While still at work on this we were visited by two residents, Panikpah, a former visitor at Redcliffe, and Koomenahpik, his father ; an invitation to share the comforts of their igloo was politely declined.

Our igloo proved icy cold, and I shall never forget the difference of temperature between inside and outside. It was just like going from a cellar into a temperature of 90°, and we resolved that unless it were storming we would in future sleep without shelter. Among our breakfast callers was the wife of Koomenahpik, Nauyaleah, the most comical old soul I had yet seen.

She evidently felt it her duty to entertain me, and began to tell me all about herself and her family ; that I had already seen one of her sons at Redcliffe, whose name was Tawanah, and who lives still farther up Inglefield Gulf; that he had stopped at Ittiblu on his return from the Peary igloo, and told her what a large koona (wife) Peary's koona was, and how white her skin was, and that her hair was as long as she could stretch with her arms.

She followed us everywhere we went, and chatted incessantly—whether we were taking photographs or making observations for latitude and time, it made no difference to her. If we did not answer her she would sing at the top of her voice for a few minutes, and then chatter again. She showed us a number of graves, which are nothing but mounds of stones piled on the dead bodies, and told us who lay beneath the rocks.

At eight in the evening we left Ittiblu, with four additional dogs obtained from Panikpah. All night long we dashed on over the smooth surface of Whale Sound, except where we passed Academy Bay. Here from one cape to the other the snow was soft and several inches deep. Again the sun only left us for a short time, and, in spite of a temperature of — 35° F., the ride was a delightful one.

SOME MISCONCEPTIONS REGARDING THE ARCTIC REGIONS.

ANGELO HEILPRIN.

THERE is no part of the earth's surface concerning which more misconception exists than the region beyond the Arctic circle. In the popular estimation the Arctic realm is one of forbidding terrors, with little of those softer qualities of nature to relieve it which make pleasurably habitable the less "distant" quarters of the globe. The eye sees pictures of ice and icebergs, of inhospitable shores and tempest-ridden seas, while the mind conjures up visions of shipwreck and disaster, of encounters with Polar bear and Innuit. A climate of dreary severity closes the picture.

All these conditions are real and existent, but they must be accepted with their limitations.

With all that may be lacking of those qualities which have endeared to us the special regions to which we are habituated, the far North has not been so completely neglected as to be deprived of individual charms of its own. Nature there, too, has its smiling moods, and with these come a genial sunshine and an inviting landscape. Patches of bright green appear here and there under an azure-blue sky, tumbling brooks and cascades sing their woes to the sea, and merry birds chant the usual morning and evening anthem. A balmy atmosphere, quiet and placid as the waters which reflect the rays of a midnight sun, recalls sweet memories of a distant South, while it mocks the long white line of snow which possibly lingers on the mountain-tops. The Arctic world in reality presents itself under two widely differing aspects—a winter aspect of rugged severity, and a summer aspect of calm and joyous repose. It is from the former of these two pictures that the commonly accepted notions of the North have been drawn.

Were the traveler to set his foot on a mid-July or August day upon the rock-bound coast of Western Greenland at about the seventieth parallel of latitude, he would there find himself in a landscape which is during the greater part of the year typically Arctic in character. He is surrounded by giant glaciers, some of the largest of the world, thousands of icebergs float out on the bosom of the open sea, and an interminable ice-cap sweeps off to the farthest limits of vision. At the time of his visit he will find much uncovered country ; clumps of bright flowers deck the sheltered intervales of glen and meadow, gay butterflies flit through a warm sunshine, and an occasional bumble-bee hums its way among the pollen-sweets. Along with the music of rills and rivulets comes the piping of the thousands of mosquitoes which lend their aid to give voice to the landscape. This is a true Arctic picture—the picture of the region a thousand miles still nearer to the Pole, and of both the Eastern and Western hemispheres.

The most prevalent fallacy concerning the Arctic regions is that which attaches to them a uniformly severe climate. The cold winter is made to do service for the summer season as well, and it is assumed that the entire region, or at least the greater part of it, is permanently ice-bound. Nothing can in reality be farther from the truth. A dark and lingering winter casts its impress upon the landscape for many months of the year, but it is succeeded by months of bright and vigorous sunshine, when the atmosphere shows a luminosity which is not approached elsewhere, and when nature's processes work with all the vigor of first birth. June, July and August, with balmy premonitions in May, and the afterglow of September, constitute the Arctic summer. For much of this short season the temperature continues mild and singularly uniform, the mercury in the shade oscillating between a few degrees below the freezing-point and a few degrees above it. In the two summer experiences of the writer the lowest temperatures recorded were 22° and 29° F. In a general way the mercury stood at about the freezing-point, and it was then a delight, with only moderately heavy clothing—discarding all the makeshifts of Arctic paraphernalia—to wander over the cliffs and through the mountain passes, feeling neither cold nor warm (although more nearly the latter). Even on the ice-cap, up to an elevation of two or three thousand feet, or even more, the same mild temperature prevails. In the sun, on the other hand, the mercury ranges well into the seventies, and not infrequently passes beyond the eighty line. On the 27th of June, on the cliffs of the island of Disko, under the sixty-ninth parallel, and just along the ice-cap, at an elevation of two thousand feet, the writer found the mercury marking 82°, and a temperature of but a few degrees less was experienced for days in succession five hundred miles farther to the north, or under the seventy-eighth parallel.

No one who has not personally had the experience can conceive of the delight of basking in this warm sunshine, whether it be lazily lolling on the deck of some vessel sailing the ocean blue, or stretched out over the carpet of moss and grass, surrounded by the most brilliant flowers, and listening to the twitter or chirping of hundreds—nay, thousands—of birds. So entirely different is this scene from that which is generally fastened upon the eye of the imagination. The omnipresent iceberg gleams with the full intensity of the sun's powerful rays, but it is a peaceful, slumbering mass of white, and not the impending tooth-armed mountain with which the illustrations of travelers have made us familiar. There are groaning and creaking to accompany the dissolution of these giant masses of ice, but the work of destruction proceeds smoothly and evenly, rarely exhibiting itself in that cataclysmic mood which has been called in to do honor to the terrors of the North.

Once realizing the mildness of the summer climate, surprise can hardly be felt at the statement that in many parts even of the well northern Arctic tracts there is to be found a fairly luxuriant vegetation—a vegetation that surprises not only by the profusion of individual vegetable forms, but by the diversity of types, especially among the flowering plants, which present themselves. The favored or more sheltered spots of the North vie in luxuriance with the far-famed upper valleys of the Alps, where the Alpine rose, gentian, and mountain pink give color to the landscape. In the American Polar tract north of the eightieth parallel of latitude there have been collected not less than seventy-five species of flowering plants, besides a multitude of grasses, mosses and lichens. The colors of the flower-carpet are of the most intense pink, purple, yellow and white. Vast expanses of the yellow poppy, with which are associated buttercups, star-worts, potentillas, drabas, mountain pinks, and saxifrages, recall our fields of daisies and clover, while various heaths and an occasional harebell transport us to the Highlands of Scotland or to the Baltic's shores. The dwarf rhododendron and mountain pink, too, carry us to the ice-surrounded valleys of Switzerland. The Arctic poppy might, perhaps, from its abundance, and the broad yellow coloration which it gives to the landscape, be considered to be the representative flowering plant of the high Arctic regions. It was found by Mr. Peary in Greenland even beyond the limits of the great ice-cap.

In Greenland no elements of a strictly arboreal vegetation are to be met with north of the sixty-third parallel of latitude, but representatives of two or more trees, procumbent, gnarled and twisted, are at least suggestive of woodland scenery. These are the dwarf birch and Arctic willow, the former of which, diminutive in its stem and leaves, rears itself but a few inches above the surface, while the latter succeeds in scattering its frame over an extent of three or four feet. Both plants may be said by their aggregations to form diminutive forests, over which the shadow of an ordinary large hat would cast a darkening cloud. In Siberia, on the other hand, the upright larches follow the Jenissei as far as lat. 69° 40′, and Nordenskjöld describes the components of the pine and fir forests beyond the Arctic circle as being of colossal dimensions.

Especially luxuriant is the grass growth in certain parts of the Arctic regions. The long period of bright sunlight which marks the comparatively brief summer forces plant-growth in a remarkable manner; a few days of mild weather will frequently convert what has been a dreary gray expanse into a smiling garden. The grass and gay flowers shoot up everywhere, and their abode carries us to the very border of the perpetual ice-cap. There is, indeed, no more charming landscape than that of the oases of flowers, grasses, and mosses which circle around the rock-islands ("nunataks") which here and there protrude their heads through the glacial streams.

Another popular misconception regarding the Arctic regions is the supposition that they are perpetually ice-bound. The preceding remarks bearing upon the vegetation will have largely corrected this notion, but it may not come amiss to state that a region which is invested with a snowy mantle throughout the entire year has not yet been discovered—not even in the most northerly tracts that have been reached by man. A perpetual ice-cap usually covers the greater elevations, but below a level of two thousand or fifteen hundred feet, except where glacial tongues descend seaward from the ice-cap, the country is almost invariably open for two or three months of the year. A line of perpetual snow, which coincides with the level of the sea, whatever may be the reasons for its non-existence, is unknown either in the Arctic or in the Antarctic regions.

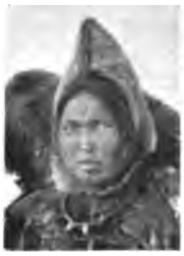
Indeed, in some parts of the Arctic tract, as for example in Grinnell Land, on the United States Mountains, not only the lowlands, but also the highlands, are at times uncovered even in the winter months.

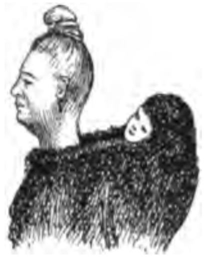
That the winter months in the Arctic regions are severe in the full sense that the word implies must be admitted. Kane experienced a temperature of — 69°, and the records of the British Polar Expedition of 1875–76 indicate a minimum March temperature of — 73°. At Yakutsk, in Siberia, however, which is situated considerably south of the Arctic Circle, an extreme cold of — 79° has been registered, which is only two degrees less than the very lowest known reading of the thermometer (— 81°, at Verkshojansk, Siberia, lat. 67°), except where artificial means for lowering the temperature have been resorted to.

But it is not to be assumed that this excessive temperature carries with itself any special hardships, or that it is markedly more unbearable than a — 40° to — 50° in Manitoba, or on the Western plains of the United States. Arctic travelers have freely admitted that the excessive dryness of the far northern regions largely antagonizes, so far as the simple sensation is concerned, the painful effects of the cold, and that oftentimes, even with a very low thermometer, the cold is much more endurable than the cold of the more southerly regions, where the thermometer has not even descended to the zero-point. The members of the Peary Expedition slept in the open air in their sleeping-bags when the thermometer marked — 40°, and Mrs. Peary herself expresses no special inconvenience traveling about with the mercury standing at this position. It is a significant fact that the lowest temperature recorded by Mr. Peary was — 53°, and it is interesting to note that on the 15th of February, 1892, when a heavy rainstorm swept over the region of McCormick Bay, under the seventy-seventh parallel of latitude, the temperature rose to 41½° F., or several degrees higher than it did on the corresponding day in some parts of the Southern States.

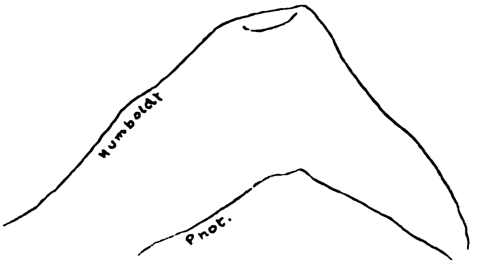
PHOTOGRAPHY IN TRAVEL.

IT will be generally admitted that the camera is to-day one of the most important adjuncts of the traveler's equipment. It not only renders faithfully what the traveler sees and learns, but it prevents that perversion and distortion of facts to which, unfortunately, many (indeed, one might say, the greater number of) travelers are prone. The sketch-book and color-box, while they are still necessities of every tour of exploration, are at all times difficult to manipulate, especially in the hands of the many who are not initiated into the mysteries of art, and cannot help, in the absence of the correcting medium of the camera, graphically to misrepresent the aspects of a country and of its inhabitants. One has but to compare the works of travel illustrated by the free-hand process with those to which photography has lent its aid to note how vast is the difference in the results obtained. If the same region is treated of by the two classes of books, it will frequently be found that the landscape is indeterminable and even the physiognomies of the people unrecognizable. We have but to place before our readers, as one of innumerable examples that could be brought forward, two representations of the Greenland Eskimo, one from the facile pencil of the distinguished Kane, and the other from the kodak of Mr. Peary, to illustrate the points in view. Not even a bond of racial relationship can be obtained from the comparison.





It is true that there are those who can faithfully and effectively wield the pencil or brush, but they belong more particularly to the class of the professional artists rather than to that of the explorers, and their assistance can generally be obtained only in the work of elaboration after the completion of a journey. The deficiencies of the pencil-and-brush method arise not alone from the difficulty of handling these instruments, but from the still greater difficulty of mentally interpreting what the eye sees. How many observers, for example, can correctly, or even with an approach to correctness, estimate the height of an object in the field, whether it be a tree, a steeple, or a mountain, and place such an object in its true relations in a drawing? How many are there who can properly gauge the angle of slope of a mountain? It is well known that travelers frequently describe great rock-masses as rising nearly vertically for thousands of feet, when possibly the average angle of slope does not exceed thirty or thirty-five degrees ; and even experienced mountaineers have been known to describe long mountain slopes as rising at an angle of some fifty or sixty degrees, when the actual inclination barely exceeded half that amount. The time-honored representations of volcanic peaks rising like sugar-cones are an illustration of this deception. The following views of Orizaba, the one taken from Humboldt's *Vues des Cordillères* and the other from a photograph, require no comment.



It may, however, be objected that the mind interprets differently from the camera, and that the mental picture requires the correction of the pencil. A man standing near the base of a giant wall and gazing upward at its cornice, usually sees the wall impending over him ; the foreshortening of the upper distance has brought the line of the wall over his head. This deception is frequently experienced in high-mountain regions. The Dolomites of the Tyrol may appear, so to say, vertical, the Wetterhorn (especially if its base is shrouded over in fog and cloud) to arch over the visitor from Grindelwald. The great Cañon of the Colorado is commonly received as being a narrow cut or fissure of the earth's crust, when in reality the walls slope outward at such a broad angle as to separate the crests of the cañon by an interval of from ten to fifteen miles. The mental aberration has its true effect, but it should have no justification from the pencil. Each individual observer sees differently, all seemingly in the direction of exaggeration, and therefore the multiple observations should be reduced to a single standard of comparison—that of the true picture. From this picture, then, every one can deduce his own individual mental concepts.

The use of the camera in travel is by no means new, some of the finest results in

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THE MELVILLE GLACIER—INGLEFIELD GULF, GREENLAND.

exploration having been obtained as many as twenty or twenty-five years ago. It is only within the last few years, however, with the advances that have been made in the photographic art, that the instrument has become a *sine qua non* with the traveler. The direction of improvement lies largely, one might say mainly, in the compacting of the instrument and the introduction of the film-roll. There is no spot to-day where the traveler goes that the camera cannot go with him, and with scarcely an addition of weight to his accoutrement.

Objection has been frequently urged against the film-roll camera on the ground that its results are not so good as those obtained by the "regular" instruments, and that, in fact, there are often no results at all. The statement of results is in a measure a true one, and there can be no question as to the desirability of using a plate camera when this can be done. But it cannot be too strongly insisted upon that there are many places in a journey where the ordinary camera, whether by reason of bulk or weight, cannot be conveniently taken, or cannot be taken at all. In such places a film-roll can do efficient service, even if the results obtained do not prove in every way satisfactory. But a half-satisfactory result, from the point of view of the explorer, is much better than no result at all, and the explorer, if he is wise, will use his camera under all conditions, and not heed the oft-given advice of the professional photographer as to the uselessness of pictures taken under conditions of fog, cloud or rain. Views frequently present themselves but once in a journey, and the traveler cannot abide his time waiting for favorable conditions to set in. The results obtained may not be "pictures" in the artist's sense of the term, but they are permanent renderings, either in part or in whole, of scenes of nature gathered in the course of exploration, and are the more important. It is the experience of many travelers, however —an experience covering the greater part of the earth's surface—that absolutely satisfactory results can be obtained from the film-roll camera, and it is to them also well known that in the treatment of ethnological subjects, in a region where a natural shyness makes approach to the natives difficult or all but impossible, oftentimes only the instantaneous and "ready-multiple" method can be successfully followed. The disadvantages of using the film are well known, and should be properly borne in mind. The film-roll camera should not usurp the place of the regular camera, but it should invariably be added as an adjunct to it, helping to do the work, and doing the work where it would have been left undone without it. Its compact form and light weight should entitle it to a permanent position about the body, ready for service at an instant's notice.

EMIN PASHA.

THERE seems little reason to longer doubt that Emin Pasha, one of the most intrepid and learned of African explorers, has been murdered by a revengeful slave raider, Said bin Abed. Report places the scene of the murder in the country of the Manyemas, in the Upper Congo region, and the time in October of the past year. It appears from a recovered note-book of the explorer, the last entry in which covers the period from May 29th to October 12th, that Emin, with a small band of trusty followers, was then making his way from the great equatorial lakes to the west coast, hoping to emerge in the Cameroon country, when he accidentally encountered the brutal trader at whose hands it would seem he so summarily met his fate.

African exploration, and still more, civilization, can ill afford to lose this remarkable character. The smiling fields and happy faces of the Lake region speak of a practical success in the lesson of civilization, and of a work that fittingly crowns the unremitting labors of nearly fifteen years. Less fanatical, and to an extent more practical, than his master and predecessor, the late General Gordon, Emin applied himself with a zeal and devotion to a cause which rendered failure all but impossible. In his capacity as Governor of Equatoria he appears to have exercised a considerate control over his subjects; his many years of almost single-handed toil among some of the most intractable people of the "dark continent" prove his capabilities as a ruler and organizer, and are a sufficient answer to the charges of incompetency and vacillation which a jealous rivalry has nurtured and developed. Emin, whose true name was Eduard Schnitzer, was born of Jewish parentage, in Oppeln, Silesia, in 1840, and had, therefore, at the time of his assumed death, barely passed into the prime of life. Early trained in science and linguistics, he was eminently qualified for the work to which he devoted the better years of his life, and it can truly be said of him that he belongs to that limited group of explorers who are at the same time not only travelers but investigators. As an African explorer he will rank with Barth, Schweinfurth and Junker. To him geographers are largely indebted for a knowledge of the region about the Albert Edward Lake and the Mfumbiro Mountains, and for the more accurate delineation of the Victoria Nyanza. His contributions to a knowledge of the natural history of East Central Africa are more extensive than those of any other traveler, with the possible exception of Schweinfurth, and would alone entitle the author to lasting recognition among scientists. If lacking in those sterner qualities which have helped Stanley to the not unjust designation of "Africanus," Emin had at least the satisfaction of knowing that his work appealed equally to the cause of discovery and to that of humanity. The Royal Geographical Society of London in 1890 decreed to him their Patron's Medal, "in recognition of the great services rendered by him to geography and the allied sciences by his explorations and researches in the countries east, west, and south of the Upper Nile, during his twelve years' administration of the Equatorial Province of Africa."

The extent of Emin's activity may be inferred from the fact that the elaboration of the results of three years' exploration (1890–92) covers, in addition to much other material, thirteen plates of mountain profiles, one hundred and forty-six pages bearing upon the route of travel, one hundred and eleven (folio) pages of hypsometric details, and the vocabularies of twenty distinct languages!

THE SELKIRK MOUNTAINS.—THE AMERICAN SWITZERLAND.

OF the many regions of the American continent which with more or less inaptness have been termed the "Switzerland of America," none is so clearly entitled to this designation as the region of the Selkirk Mountains, in British Columbia, which has of late years been opened up in the work of construction of the Canadian Pacific Railroad. With the mountains mostly two or three thousand feet less high than the mountains of real Switzerland, they yet partake of the same grand construction, and present to the eye of the traveler a bold and rugged contour which is strikingly at variance with the outlines which are presented by the southerly extension of the Rocky Mountain system in the United States. The scenery, if perhaps not always more beautiful or majestic than that of Colorado or New Mexico, is of a different character, and more nearly of that special type which is distinctively alpine. Wild, towering peaks, bearing in their form and construction the impress of the rock-movements which have built them up, sharp arêtes, and angular snow-capped cornices, together with vast snow-fields and almost innumerable glaciers—all overlooking forest-clad valleys of transcendent beauty—are the special features which distinguish this wonderful district. Mr. Spotswood Green, the distinguished explorer of the New Zealand alps, thus describes the region: "The peaks do not rise so high above the general level of the glacier *firns* as to be comparable with the higher ranges of the Swiss Alps. They resemble more some of the ranges of the Tyrol. The grand forest-clad valleys of the Selkirks can, however, scarcely be surpassed for beauty. The St. Gothard Valley, and the ranges between it and the Bernese Oberland, including the Rhone Glacier, will afford the best comparison I can think of; but the views obtained from the Canadian Pacific Railway are grander than anything visible from the St. Gothard. . . . . We pass from the forest regions to the heights above—'alps' we call them in Switzerland. In the Selkirks, as yet, the brown châlets are missing, and our ear fails to catch the clang of the cow-bells, but the flowers are there in rich profusion. When in the high alps of New Zealand, I had to acknowledge that the alpine flora was far inferior, in color at least, to that of Switzerland. Not so in the Selkirks. Were it not that the blue star of the gentian is missing, I would say that we had more color in America. The most conspicuous of these alpine plants is *Castilleja miniata*, its scarlet blossoms giving a marvelous brightness to the mountain slopes, and to the older portions of the glacier moraines, which were perfect gardens of flowers."

The special interest of this remarkable region centres in the glaciers, which are the most readily accessible of any on the continent; one of these, the Great Selkirk or Illecellewaet Glacier, is, indeed, brought within a half hour's walking-distance of a railway station. Less imposing than the great ice-sheets of Switzerland or Tyrol, they are yet of sufficient magnitude to touch in detail nearly all the broad lessons taught by glaciology. Of none does the tongue much exceed two and a half or three miles, although the Illecellewaet with its *firn* measures not less than six miles, while the thickness of the ice has been estimated at 500 feet. Like all the northern ice-sheets of to-day, they show evidences of recent shrinkage, although it is by no means certain that an advance is not again taking place. Mr. Green determined the rate of movement of the centre of the ice in the Illecellewaet Glacier to have been at the time of his visit about twenty feet in thirteen days—the rate of the slow-moving glaciers of the Alps. In an ancient moraine in front of this ice-sheet is one of the largest of known "erratics," measuring fifty feet in length by twenty-four by thirty-three feet; and still farther down the former bed of the ice-stream is a boulder whose dimensions are ninety-one by forty by forty-four feet. Crevasses are largely developed in the more steeply inclined portions of the glaciers, but in the lower flat reaches the ice is largely solid and easily traversed.

The level of perpetual snow in the Selkirks is found at about 7000 feet, and it is doubtful if any of the mountain peaks rise above this line. Sir Donald, with an altitude somewhat exceeding 10,600 feet, is seemingly the loftiest summit. The stately growth of fir, cedar, spruce, and hemlock—some of the trees of gigantic dimensions—approaches in places to within a thousand feet of the snow-line. It is rankly overgrown by undergrowth, and harbors a vast amount of game—bear, deer, Rocky Mountain goat and sheep, marmots, hares, etc. The writer already quoted gives the following graphic description of the northern primeval forest: The trees "all attain huge dimensions, cedars eight feet in diameter being frequently met with, and they often grow so close together that I could not pass between their trunks. . . . . Beneath the living trees thousands of prostrate trunks lie piled in every conceivable position, and in every stage of decay. They are to a certain extent overgrown by rhododendrons (*R. albiflorum*) and blueberry bushes (*Vaccinium myrtilus*), and, in the damper parts of the forest, by the devil's club (*Fatsia horrida*)—a plant beautiful to

THE APPROACH TO THE SELKIRKS.

look at, with large, bright-green palmate leaves and tufts of coral-red berries, but whose thorns, if they penetrate the flesh, produce festering sores. Picture yourself, then, with a forty-pound pack on your back, creeping along a slippery, fallen trunk, fending off a devil's club with an ice-axe, wriggling under fallen trees, or eight feet from the ground on the top of them, and you will have some idea of what travel in the Selkirks means." Those who are acquainted with the inner depths of the Adirondack wilderness, or with the laurel chaparrals of the Alleghanies, will readily appreciate what traveling in such a forest region signifies; but the solemn beauties of the landscape which are there always present will continue to attract to these fastnesses the lovers of nature's wilder moods.

THE HIGHEST MOUNTAIN ASCENTS, AND THE POSSIBLE LIMITS.

MOUNTAINEERING as it is to-day recognized is an art which dates back barely more than a century. It has been pretty conclusively established that neither the Romans nor the Greeks ever ascended high mountains except for the express purpose of crossing them. A love for nature, the charm of the view, never impelled them in that direction; on the contrary, they sought the delights of nature in the low country, amid pastures, fields and vineyards. They enjoyed that which is to-day perhaps most appreciated by the Pennsylvania farmer—the ripening grain, a golden cornfield, and a distant view over blue forest and hazy mountain.

To ascend a mountain for any but a practical purpose appears to have been all but unknown before the time of Petrarch, who seemingly was the first to expatiate upon the beauties of the high-mountain landscape—a cult in which he was followed by the painter Leonardo. It is recorded that in the Columbian year 1492 Julien de Beaupré, Chamberlain to Charles VIII. of France, by royal command of his master, ascended the Mont Aiguille, in Dauphiny, a mountain which does not quite equal in altitude Mt. Washington, in the White Mountains. This was considered so remarkable a feat that *Te Deums* were sung when the summit of the mountain was reached, and a regular baptism of the mountain indulged in. The following narration illustrates the supposed terrors and hardships of that "remarkable" ascent: "On June 26, 1492, I, François de Bosco, almoner to the Seigneur Julien de Beaupré, in company with other hardy adventurers, ascended the Mont Eguille, or Mont Inaccessible, and the day following, having said Mass on the said mountain, ate, drank, and reposed thereon, the Seigneur Julien de Beaupré changed the name of the mountain from Eguille, or Montagne Inaccessible, to Eguille forte, causing it to be solemnly baptized in the name of the Holy Trinity by a certain Sébastien de Carect, one of the Royal Chaplains, and afterward chanting the *Te Deum*, *Salve Regina*, and many other anthems."

Less than thirty years after this date (1519) it is asserted on the authority of one of the Spanish chroniclers of the American Conquest, Bernal Diaz, that a number of the followers of Cortes, under the lead of Diego de Ordaz, for the purpose of obtaining sulphur from the crater of Popocatepetl, ascended that volcano to its crest, or to an altitude of upward of 17,000 feet. This statement, in view of the difficulties of the ascent, the circumstance that practically no mountaineering had been done before that time, and the general apathy of the Spaniards to work of that kind, scarcely appears credible; and, indeed, Alexander von Humboldt has found good reason to doubt the accuracy of the Diaz narration. Cortes himself affirms, contradicting Diaz, that in this first attempt his men were unable to pass much beyond the snow-line, but states that in a subsequent effort, in 1522, the summit was reached, and that even a descent was made into the crater.

The first recorded undoubted ascent of a glacier-covered mountain, or one permanently invested in a mantle of ice, seems to be that of the Buet in 1770; sixteen years afterward Balmat and Paccard ascended Mont Blanc (15,784 feet), and from that time on mountaineering has gradually developed into an art of its own. So rapid has been the development of this

THE GREAT GLACIER, SELKIRK MOUNTAINS.

special field of physical exercise that while less than a half century ago the ascent of almost any of the higher peaks of the Alps was considered as an undertaking requiring more than ordinary caution in its accomplishment, to-day there is scarcely an Alpine summit of prominence which has not been ascended, and many of them by women as well as men.

The highest mountain ascent appears to have been made by Graham, who in 1886 ascended the Kabru, in the Sikkim Himalayas, to an altitude, determined barometrically, of 23,700 feet. Some authorities, Whymper among them, seem inclined to doubt the accuracy of the elevation given, but probably it is not far from the truth; as such it exceeds by 1440 feet the famous ascent of the Schlagintweit brothers, in 1855, of the Ibi Gamin (22,260 feet). While not attaining the full height claimed to have been reached by Graham, Mr. W. M. Conway has latterly put on record the finest piece of mountaineering which has yet been attempted. His ascent of the (newly named) Pioneer Peak, in the Karakorum range, to an altitude of 22,500 (+) feet, is a remarkable achievement in itself, but that which most clearly points out the advances that have been made in the mountaineer's craft is the comparative facility with which this daring mountaineer passed days of toil and scientific work at elevations exceeding 17,000 and 18,000 feet. There are a large number of peaks among the Central Asiatic mountains which considerably exceed in elevation the highest points that have yet been reached, and a full mile still intervenes between Graham's position on the Kabru and the crest of the Gaurisankar.

In Africa mountaineering has reached its upper limit; Kilima'njaro, the loftiest summit of the continent—19,700 feet—was ascended by Meyer and Purtscheller in 1889. In South America much virgin soil still remains. Whymper, Reiss, Wolf and Stübel have ascended many of the equatorial peaks—Chimborazo, Cotopaxi, Pichincha, Antisana, Cayambe—to elevations of 19,000 and 20,000 feet—Whymper to the summit of Chimborazo, 20,500 feet—while Güssfeldt, on Aconcagua (1883), has placed his record at 21,089 feet. Seemingly mental worry, brought about through misunderstandings with his native "guides" (rather, carriers), was the main cause which prevented the last-named investigator from reaching a much higher position. The summits of Illimani and Sorata, as well as Aconcagua, still await the footsteps of the mountaineer.

The highest positions attained on the North American continent are on Orizaba (18,200 feet); Popocatepetl (17,500 feet), and Ixtaccihuatl (16,970 feet). The peak of Orizaba, or the Citlaltepetl, was ascended for the first time by Major Reynolds in 1848, since which year some five or six ascents have been made. Ixtaccihuatl, for a long time considered inaccessible by the Mexicans, was first ascended (to the summit) by Salis in November, 1889, in December of the same year by Whitehouse, of the American Legation, and in April, 1890, by Heilprin and Baker, accompanied by two Indian carriers. North of the Mexican boundary the highest postion attained on any American mountain appears to have been on Tacoma, 14,444 feet, the summit of which has been several times reached. Russell's heroic effort on Mount St. Elias in 1891, which placed to his credit 14,000 feet, must be considered one of the most remarkable of mountain ascents, since it was made throughout the greater part of the distance over snow and ice-fields.

The question is frequently asked, What are the limits of mountaineering, or to what ultimate point can a mountaineer ascend? The answer to this can safely be hazarded that probably no elevation on the earth's surface is really inaccessible, or will not ultimately be conquered. Neither Graham nor Conway experienced any remarkable hardships in their surpassing efforts—nothing beyond extreme fatigue and the ordinary difficulties attendant upon work in an extremely attenuated atmosphere; and, indeed, both Graham and Conway were confident that with better preparation and additional time much higher positions might have been attained than were actually reached. One of the greatest obstacles in the way of success to the mountaineer, and one which is very much more far-reaching than the matter of rarefied atmosphere, is the necessity of carrying a heavy equipment — food, clothing, and shelter. Especially irksome has been the necessity to provide for bodily warmth and protection from the elements, and it has always been a question how best to meet these exigencies of travel with the least interference to locomotion. The solution to this problem seems to be afforded, in great part, at least, by the clothing which was used by Mr. Peary in his recent journey across Greenland. A light reindeer suit would seem to afford all that was necessary either as a warmth-giving garment or as a protection from storm. Within its shelter, neither tent nor heavy blanketing is longer necessary. Its adjustment is such as to provide for both high and low temperatures, while it virtually offers the nearly full protection of the sleeping-bag. Through its use, and the special advantages which the latest condensed-food supplies afford, one may confidently look forward to the near future when the loftiest summits will fall before the pick and axe of the Alpinist. It is merely a matter of pluck, judgment, and expense. Some mountaineers will find their bodily frame such as not to permit them a free exercise in these more elevated regions ; others will certainly be able to habituate themselves to the exacting conditions which the cold and the rarefied atmosphere lay down. Mr. Clinton Dent, himself an Alpinist of reputable standing, correctly states the position when he says : "Neither on mountaineering nor on physiological grounds does the possibility of ascending Gaurisankar appear hopeless. To some extent a question of men, it is largely a question of money. . . . The attempt would be costly, long, laborious, and not free from risk ; but it is possible."

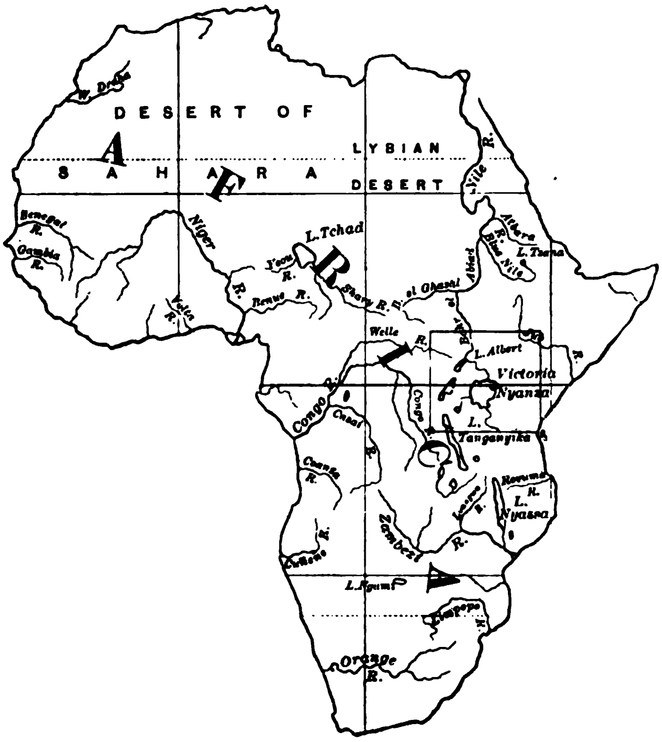
JOSEPHINE DIEBITSCH-PEARY.

THE courageous woman who is about to enter upon her second winter in the high Arctic regions was born, of German parentage, in the city of Washington, twenty-seven years ago. Her father, who, as well as the grim marshal, the "Transgressor of the Balkans," who in 1831, as a trusted servant of the Czar, aimed to crush the Polish insurrection for independence, bore the name of Diebitsch-Sabalkanski, was a native of Polish Silesia, whence with comparative young age he emigrated to seek his fortune in the New World. Early impressed with the American spirit of equality, he dropped the conferred name of Sabalkanski, and settled down in and about Washington as plain Mr. Diebitsch. For many years before his death, which took place a few years ago, he was associated with the Department of Foreign Exchanges of the Smithsonian Institution—a position for which he was well qualified by reason of his intimate knowledge of foreign languages.

Mrs. Peary's fondness for outdoor life developed in her that liking for sport and that practical knowledge of the conditions and elements of sport which permitted her to stand the trials of solitary womanhood among the northern ice-fields, and among an absolutely strange people, with comparatively little discomfort. An expert marksman, she has helped to replenish the larder of the little Redcliffe colony, and with a calm presence, not less to be admired because it was a woman's, has stayed the fortunes of battle with the savage walrus. Under her supervision was prepared much of the equipment of the late expedition, and it was her nursing hand, assisting a patient and conscientious physician, which so largely helped to bring about an early restoration of the disabled commander of the expedition. Mrs. Peary accompanies her husband a second time, believing it to be her duty to render such assistance as she may be capable of, both materially and in the way of companionship.

THE SOURCE OF THE NILE.

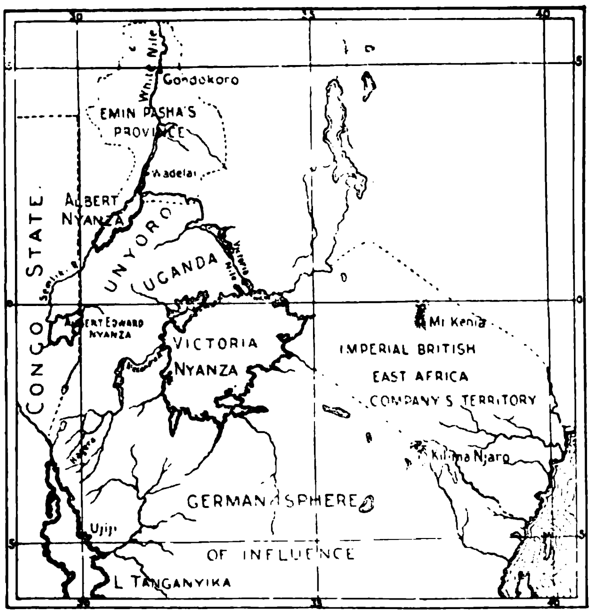
THE question of the ultimate source of the Nile, which has attracted the attention of geographers for a period of more than two thousand years, has been definitely solved by the recent researches of Dr. O. Baumann. Thirty years ago Speke, the discoverer of the Victoria Nyanza, sent to the Royal Geographical Society of London his famous laconic dispatch : "The Nile is settled." At that time the Victoria was supposed to be the only large lake of Central Africa whose waters were in direct communication with the Nile, and it was naturally assumed, from the southern position which the lake occupied, that it was the fountain-head of that stream. A year later Baker discovered a second large lake, lying to the west of the Victoria—the Albert Nyanza—whose waters likewise communicated with the Nile, and announced it as the "great basin" of that river. Baker thus shared with Speke (and Grant, the associate of Speke in his explorations) the honors of discovery of the source of the Nile, and for many years the two lakes were considered to be of nearly equal importance as reservoirs of the king of African waters. Later explorations, however, determined the fact that the Albert Lake was, as



MAP OF AFRICA SPECIALLY INDICATING THE NILE LAKE REGION.

compared with the Victoria, of but insignificant extent, covering only one-fifteenth of its superficial area, and further, that a portion of the region which it was supposed to occupy was in reality occupied by a second (more southerly and much more elevated) lake, the Albert Edward, which drained into it through the Semliki River. The claims of the Victoria Nyanza to be the true "great basin" of the Nile have thus been re-established, and it was reserved for Dr. Baumann to determine conclusively which of its many tributaries was its principal feeder, and, consequently, the mainspring of the Nile. This is shown to be (what, indeed, had already been suspected by Speke) the Kagera or Ruvuvu (Alexandra Nile), a western tributary, whose several sources are found in the mountain chain immediately bordering the northeastern shores of Lake Tanganyika, between the third and fourth parallels of south latitude. The *caput Nili quaerere* thus becomes a chapter of past history. With the Alexandra River as its ultimate source, the Nile traverses a territory extending through thirty-five degrees of latitude, and measures a length but little inferior to that of the combined Missouri-Mississippi system of waters.

The Victoria Nyanza occupies a basin in the crystalline rocks at an elevation of nearly four thousand feet, and has been described by some travelers as being of almost surpassing beauty, singularly imposing in periods of storm. Its superficial area is not far short of twenty-five thousand square miles, ranking it (in extent) after Lake Superior as the largest known body of fresh water on the surface of the earth; in depth it varies from about fifty to four hundred feet. Its native names are Ukereve and Nerrea Bali. Dr. Baumann makes



THE NILE LAKE REGION AND EMIN'S PROVINCE.

the interesting observation that the Warundi designate all the larger lakes as "nyanza," and lakes in general as "tanganyika"—a custom, followed by some of the other tribes, which has led to considerable confusion in the placing of geographical names.

TRAVELING IN INDO-CHINA.

HON. GEORGE N. CURZON, M. P.

THE Hon. George N. Curzon, M. P., in a recent communication made to the Royal Geographical Society of London, gives some very interesting notes regarding the art of travel in the region which has latterly so largely occupied the political eye of both France and England. Referring to the Mandarins' Road leading to Hue, the capital of Annam, he states :

The means of locomotion upon it are threefold, although it is seldom that the traveler is at liberty to make his choice. The first is the Annamite pony, a diminutive steed of great pluck and sureness of foot, not unlike his Korean brother, though rather a greater gentleman in appearance. He is so small that a European girth is almost always too large for his body, but he will carry a light English saddle. The natives ride him with a wooden saddle, and with a very narrow iron stirrup, which they grip in the cleft between the big toe and the remaining toes. These ponies are less quarrelsome than the Korean, and are so docile that they make no difficulty about crossing the numerous *bacs*—*i. e.*, rivers, estuaries, or lagoons—with which the road is intersected, and which can only be traversed in rude native boats, where a single movement of the horse would overturn the craft and its contents in mid-stream. In the country these ponies can be bought for £1 to £2 ; but in the cities, where they are ridden by French officers, and are driven both in pairs and four-in hand, fine specimens will fetch from £ 10 to £ 20.

The second vehicle of locomotion is the hammock or palanquin, of which there are two varieties, the commoner consisting of a rude straw netting slung upon a pole, which is borne by two or more coolies ; and the more elaborate official or mandarin's palanquin, which is a net of crimson cords, has richly lacquered ends, a roof and screens, and which is carried by four or eight men. All mandarins, from the highest rank downward, travel in these palanquins, and most Europeans follow their example, especially in parts where ponies cannot march, or are not procurable. But for a tall man they are insupportable. Being fashioned to hold the diminutive Annamite, they cannot accommodate a six-foot Englishman, and the most telescopic contraction of my lower limbs rendered it impossible for me to occupy one for longer than an hour. Seasoned travelers, however, sleep in them, while being carried along, with ease. The coolie bearers march at a jog-trot, which enables them to cover the ground with great rapidity, and to accomplish at least four miles in the hour.

The third means of locomotion is the light chair, known in the East as the Hongkong chair, the back, seat and foot-rest of which are attached together by cords, and which is carried by poles upon the shoulders of four or eight men. It is almost exclusively employed by Frenchmen traveling between Turan and Hue, but it is not indigenous to the country, and will be found in none of the trams.

The most remarkable institution of travel in Annam is that of the *trams*, or system of government postal stations stationed along the main highways. These consist of posts at distances of from eight to fifteen miles apart, to each of which are attached a number of able-bodied men of the neighborhood, who are held at the service of the State, being exempted in return from the *corvée* and from military service, and receiving a ration of rice. They are liable to be summoned at any hour of the day or night from their houses or from the fields by the *doi* or superintendent of the tram, who beats a drum, and, if they fail to comply at once with his orders, lays about him liberally with a stick. They are employed to carry the government post, are at the disposal of the mandarins, and are hired by Europeans on the march. They go night and day, a messenger being sent on in advance to the next tram to advise the relay, and everywhere—*e. g.*, at ferries—they have priority of passage. There being no beasts of burden in the country, they are employed to convey all baggage, as well as to carry the hammocks or chairs. The former are slung by cords upon bamboo poles, and are borne between two men. The caravan of quite a small party

JOSEPHINE DIEBITSCH-PEARY.

will thus frequently amount, all told, to from thirty to forty men.

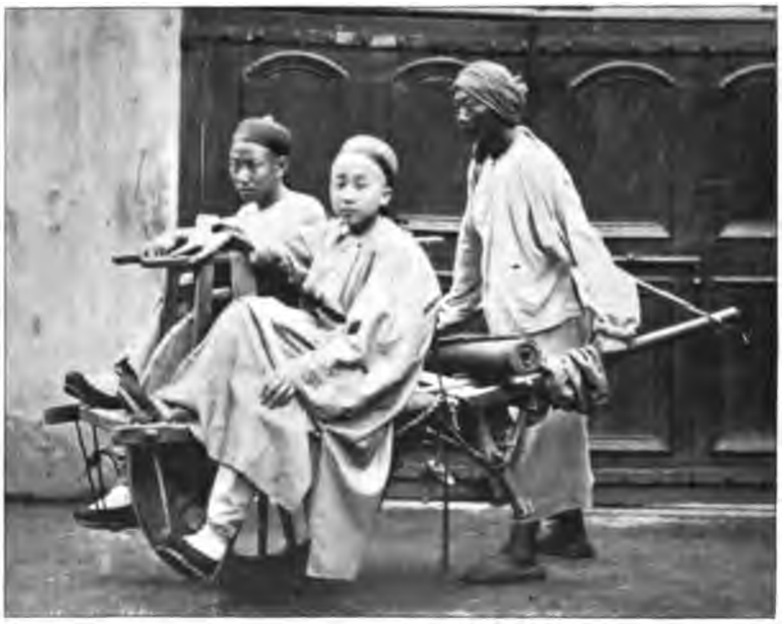
Traveling, as I was doing, in semi-official fashion under the courteous patronage of the French, I was enabled to proceed with greater rapidity than the ordinary traveler, having covered as much as forty miles in the day, whilst our party also met with a sort of reception at each village to which we came. A drum would be heard beating, and numbers of men would come out carrying banners of red, blue, and green flying from the top of bamboo poles. Escorted by these individuals, and by umbrella-bearers who ran behind and held over our heads the red or green-painted official parasol of Annam, we entered the village, a coolie sweeping the road clear of dust in front of us. In this fashion we advanced to the communal house, before which a table would be placed in the open street, shaded by an official umbrella, and supporting a number of plates containing bananas, oranges, eggs and other offerings; sometimes chickens or a kicking pig in a wicker hamper. Here the mayor would be standing, and, unless restrained, would kneel down and make his *lai*, or official obeisance, by three times touching his head upon the ground. Outside the larger towns we would be met by the local governor, or mandarin. He would appear in his official hammock, attended by two or three umbrella-bearers according to his rank ; by lictors carrying in a long case the recognized instruments of flagellation (administered in the same fashion as at an English public school, and considered no indignity even by persons of high position); by his pipe-bearer ; by a domestic carrying a wooden box in which were stored away his writing, smoking and chewing materials ; and by pike-men and banner-men. His own dress would, as a rule, consist of a tunic of dark figured silk or brocade worn over white cotton drawers and white stockings, and of a neatly folded dark blue, black, or green turban made of native crêpon or silk crape. In the lettered class it is fashionable to wear some of the nails long as an indication of superiority to manual labor; and I have seen a mandarin the nail of whose left thumb described an aërial parabola not less than three and a half inches in length. I met many Annamite officials and mandarins in the course of my travels, and was favorably impressed with their polish of manner, their correctness of deportment, and the quickness of their intelligence. They are divided into two categories, civil and military, and into two classes, with first and second degrees. The former are entirely recruited by examination, and their rank, precedence, and functions are defined by the rigor of an unbroken etiquette. No inferior mandarin will take a seat while his superior is stand-

A CHINESE PALANQUIN.

ing, or commence a conversation until the other has spoken.

A small ivory plaque, hanging by a colored cord upon the right bosom, indicates their rank; and those who are in the government employ receive from the State a salary in money, rice, or silk.

We append to Mr. Curzon's graphic description of the art of travel in Indo-China two views illustrating conveyances of travel in China proper—the palanquin and the barrow. Both forms of conveyance are seemingly well adapted to regions where the high-roads and by-ways are reduced to the dimensions of foot- or cow-paths, and the former presents certain features which might, perhaps, be taken advantage of in countries other than far Asia.



THE CHINESE BARROW.

THE WORLD'S LARGEST CITIES.

PROF. A. SUPAN, the eminent geographer of Gotha, gives, in a supplement to Petermann's *Mitteilungen*, a carefully tabulated review of the cities of the globe whose population exceeds 100,000 souls. Of such there are 270—116 in Europe, 105 in Asia, 40 in America, 7 in Africa, and 2 in Australia. The population of twelve cities exceeds a million, and of these four are in China and one (Tokio) in Japan. There are 35 cities (to which Buda-Pesth, with 491,938 inhabitants, may be added as a thirty-sixth) whose population numbers 500,000. In their proper relations they are as follows:

London (1891—mainly the city and inner London)	4,415,958
Paris (1891—with 15 immediate suburbs)	2,712,598
New York-Brooklyn (1890)	2,352,150
Berlin (1890)	1,763,543
Canton, China (1891)	1.600,000
Vienna (1890)	1,364.548
Woochang-Hanjang-Hankow	1,200,000
Tokio (1890)	1,155,290
Philadelphia (1890—including Camden, with 58,313 inhabitants!)	1,105,277
Chicago (1890)	1,099,850
Siangtan, China	1,000,000
Singan "	1,000,000
St. Petersburg (1890)	954,400
Tientsin, China (1891)	950,000
Constantinople (1885)	873,565
Bombay (1891)	821,764
Calcutta "	810,686
Hangchow, China	800.000
Chingchoo, "	800,000
Rio de Janeiro (1892)	800,000
Moscow (1889)	798.742
Glasgow (1891)	772,040
Hamburg-Altona (1890)	734,625

Manchester-Salford (1891)	703,479
Liverpool (1891)	697.901
Foochow, China (1891)	636,000
Boston (1890—with Brookline, Cambridge, Chelsea and Somerville)	598,669
Birmingham (1891)	570,460
Buenos Aires (1892)	554,713
Peking	500,000
Soochow, China	500,000
Changchow, "	500,000
Shaohing, " (1871)	500,000
Lanchow, " (1879)	500,000
Fachan, "	500,000

The most remarkable development of any of these cities is that of Chicago, which barely more than sixty years ago (1831) contained a population of only one hundred; to-day it is the second city of the Western Hemisphere.

Much uncertainty surrounds the population of the Chinese towns, and it will be remembered that only a few years ago Peking was credited with a population of 3.000,000 or more. To-day it has been relegated to the rank of cities with a population of only half a million.

REVIEWS AND NOTES.

BAEDEKER'S UNITED STATES. (The United States. With an Excursion into Mexico. By Karl Baedeker.) New York : Charles Scribner's Sons.

Of the many aids that have been devised for the tourist, none has so thoroughly engrafted itself upon public favor as the Baedeker series of handbooks. For thirty years or more these guide-books have been as familiar and dear to the German-speaking vacationist as have been during that time the Bradshaw and Murray with the English tourist. To enter upon an extended tour on the Continent without a Baedeker, or a Meyer or Berlepsch, its close rivals, was an anomaly; to-day it is more than an anomaly—indeed, from an educational standpoint it might almost be considered a crime—and there are few intending travelers who having once used it will willingly undertake a journey without its assistance. Its excellence is such that it has very largely usurped the place of all other guide-books, whether they be German, French, English, or Italian. The "traveler's Bible," as it is frequently called, is not only the advance herald proclaiming a condition of leisure on the part of the holder, but it is at the same time a passport for fair-dealings with hotel proprietors, cabmen, etc. No one who is not in the business itself so successfully and completely controls the affairs of hotel-keepers as does Baedeker; his recommendations, or the reverse, have a value in coin, and through the very large use that is made of the books, and the conscientious manner in which the recommendations are followed, this value becomes of the first importance.

The special excellence of the Baedeker books lies in their thorough reliability, in the full and able treatment of the subject-matter—many of the books being in part the work of some of the ablest scholars of Germany—a conscientious adherence to that form of detail which the tourist is most in need of, and the abundance of plans and maps. The last, in clearness, topographic detail, and accuracy, combine all the qualities which have made German map making a synonym for that which is best in cartography.

In the latest one of the series, the recently issued "United States," which has been prepared under the special direction of Mr. J. F. Muirhead, we find the standard fully equal to that of the twenty volumes which precede it. One has but to glance at the maps which accompany the articles on the Adirondack, Catskill, and White Mountains to see wherein lies a special superiority of the Baedeker. It is safe to say that no maps published on this side of the Atlantic, unless they be some of the large sheets of official surveys, present, even with a remote approximation, so clearly, fully, and accurately the mountains, lakes, rivers, roads, and paths of those regions. The plans of the cities are a model of neat execution, which could be advantageously followed by the designers and engravers of the street-plans of our city directories. Naturally, in a work which is so largely stored with facts, inaccuracies of statement must at times present themselves, but it will be admitted that these are singularly few in number, and very much less numerous than in any similar work prepared in the United States. The book is a cyclopædia in itself, and should be in every household where seeing and knowing one's country is considered a duty. There are few, even though they be not tourists, who will not profit from reading the introductory chapters on history, by Prof. McMaster; on constitution and government—an exceedingly lucid presentation—by Mr. Bryce (author of "The American Common-wealth"); on the physiography of the North American continent, by Prof. Shaler; and on the fine arts in America, by William A. Coffin and Montgomery Schuyler.

AFRICA AND ASIA. By Wilhelm Sievers.

The Bibliographisches Institut of Leipsic and Vienna, which issues the well-known Meyer's *Konversations Lexikon*, has undertaken to publish a series of complete text-books, if so they may be called, on the continents of the globe. Two such books, the "Asia" and "Africa" of Dr. Sievers, have already appeared, and a third, on South America, is in course of preparation. It is not too much to say that, as single-volume publications, the two works above mentioned are the most complete compendia of our knowledge of Asia and Africa that have yet appeared. Geographically and ethnologically they present a wealth of information, which is well distributed and easily followed. The history of exploration on the two continents is traced to the very latest times, and is a useful introduction to the descriptive portion which follows. Both volumes are handsomely illustrated throughout, many of the cuts being familiar as occurring in other publications of the Institut, such as Brehm's *Thierleben*, Neumayr's *Erdgeschichte*, Ranke's *Der Mensch*, etc. A number of oleograph plates of scenery, executed in the main with a real artistic feeling, vividly carry the mind of the reader to the region depicted. It is almost needless to say, for a German publication of this kind, that maps are plentiful, and equally unnecessary to note that they are all of a high quality. They illustrate physiography, geology, botany, zoology, ethnology, political divisions, routes of travel, and the general progress of discovery. It is to be regretted, in the case of the exploration map of Africa, that a greater number of colors have not been used to mark the routes of the different explorers; a superabundance of red makes the tracks difficult to follow—in fact, it makes a confusing network which can barely be unraveled. Among the portrait-cuts in the volume on Asia are those of Nordenskjöld, Junghuhn, Richthofen, Adolf Schlagintweit, Przevalski, and Bonvalot, the successful transgressor of Central Tibet; in "Africa" we find Barth, Nachtigal, Schweinfurth, Speke, Livingstone, Stanley, Junker, and Emin Pasha.

CHINESE NIGHTS' ENTERTAINMENTS. By Adele M. Fielde. New York: G. P. Putnam's Sons.

Those of Miss Fielde's admirers who have followed her through "Pagoda Shadows," published a few years since, need no new introduction to the author of the chaste little volume which is now dedicated to the folk-lore of the Celestial Empire.

Miss Fielde has resided many years in the Land of the Rising Sun, and probably there are few who are better qualified than she to depict that phase of Chinese legendry which is here touched upon and pleasantly told in about two hundred pages of text, and a number of attractive and well-executed illustrations. It will probably be many years before anything will supplant the "Arabian Nights' Entertainments," but none the less pleasurable on that account is it to be able to read the freshly-narrated tales of another country, especially when they are so well told as in the present instance.

Miss Fielde has journeyed extensively through Eastern, Southern and Western Asia, and, with eyes well equipped for seeing, and ears equally acute for hearing, has gathered in a harvest of facts which have been put to good and substantial use. For a long time associated with the mission station of Swatow, and subsequently organizer at that town of the mission school, she has specially acquainted herself with the people of that region, thoroughly mastering their language. She is the author of an extensive dictionary of the Swatow language. The Geographical Club of Philadelphia has placed her on its list of Honorary Members.

The past summer has again found its full complement of mishaps among the higher Alps. *Alpina*, the organ of the Swiss Alpine Club, chronicles twelve fatal accidents as having occurred prior to the first of September, the greater number of which befell young or inexperienced mountaineers. It is singular to note that four of the twelve cases cited resulted from the not specially dangerous exercise of hunting after *Edelweiss*. The most lamentable accident was that of the Matterhorn, on August 7th, when Andreas Seiler, a son of the well-known hotel proprietor of Zermatt, and the guide Johann Biner were swept down the mountain over a vertical distance of some fourteen hundred feet.

Around the World.

VOL. I. JANUARY, 1894. No. II.

THE PEAK OF ORIZABA FROM THE VERA CRUZ RAILWAY.

AMONG THE WORLD'S HIGHEST MOUNTAINS.—AN ASCENT OF ORIZABA, MEXICO.

ANGELO HEILPRIN.

SAN ANDRES, the starting-point for the ascent of the gray volcano, at whose western base it lies quietly nestled, is one of a numerous class of Mexican towns of which one is tempted to ask, By what process of nature did it come to be placed where it is? At an elevation of 8200 feet above the sea it is virtually within the cold zone, the *tierra fria*, and therefore beyond the region where a bountiful fruit supply would half cover the wants of an idly-disposed population. A desert of sand all around, to which nature has given a befitting vegetation of aloes and scant cactuses and yuccas, with here and there a reminder of the cherry, oak, and apple, and lofty columns of dust whirling and tossing about in all directions, and we have the immediate picture of San Andres.

Place in the eastern background the lofty mass of Orizaba and of its twin neighbor, the Sierra Negra, and in the west and south a series of minor volcanic cones, some 300–500 feet in height, and we close the picture in its frame.

No one who has not traveled in a region

like Mexico can form any just idea of the magnitude of the clouds of dust which navigate the air of the plateau during the dry season. The traveler from the north who has learned so much about the transparent purity of mountain atmospheres generally, and of the deep blue of the tropical sky, will be somewhat puzzled, not to say chagrined, to find, should he visit Mexico during the months of December-May, a sky that is perhaps more gray or rusty than blue, a haze that is penetrable for the most part only during the early hours of morning, and a mistiness or indistinctness of outline which is confusing to his eyesight.

When we ascended Orizaba, we observed clouds of dust far above the topmost point of the mountain, and the snow-covering, as we likewise found it on Popocatepetl and Ixtaccihuatl, was everywhere sprinkled with inorganic débris. Tourists who flock to the charming valley of Mexico largely for the purpose of gazing upon the wonderful form of Popocatepetl, less than fifty miles distant, frequently leave the country without being able to gratify their desire; indeed, this was the experience of one of the members of our own party.

Punctually on the morning of the 6th of April (Sunday) our guides announced that everything was in readiness for our journey up the mountain. Our little burros, laden with their burdens of provisions, blankets, and an assortment of what might be properly called sappers' implements, looked anything but promising; but we were assured that a change would be made on the outskirts of the town, and better animals provided. We mustered, all told, fifteen persons—three of my scientific associates, Messrs. Roberts Le Boutillier, Witmer Stone, and Frank C. Baker, myself and eleven guides and carriers—and ten animals. As we departed through the quiet streets, many eyes were turned upon us from behind doors and window-bars, for it had already been whispered around that we were going to attempt the impossible. The steepness of the road soon carried us above the housetops, and a little more and we gained an eminence from which the eye took in a large slice of plain below, with its diminutive volcanoes, its columns of whirling sand, its scattered flecks of towns and habitations, and the endless ramifying ravines that cut into the barren wilderness. All over this tract the surface is deep sand, the downwash of the débris from the giant volcanoes ahead of us, into which the rainwaters have carved a vast system of intercommunicating gorges and trenches. Up some of these the roadway is carried so rugged and steep in places as to bring descending objects well nigh on top of those moving in the opposite direction. You wonder, indeed, how the little burros, laden down almost to crushing, can stand the strain that is imposed upon their elastic limbs; but they plod along seemingly unmindful that there is a law of balance which their enforced but picturesque evolutions have to meet.

At an elevation of about 1000 feet above San Andres we leave the dreary open country and enter the pines. The species of pine that is most abundantly distributed through these lower pine-tracts is the long-leaved *Pinus Montezuma* (var. *macrophylla*). It is found seemingly on the slopes of all the giant volcanoes of the Republic, associated more or less with a closely related form, the *Pinus pseudostrobus*, and with *Pinus Teocote*. The form of the uplands is also found on the lower eastern declivities of the plateau, as, for example, on the hilltops about the town of Orizaba, at an elevation of 4500 feet; but on the southwestern descent to the volcano of Jorullo we met with the species as low down as 4000 feet, where it makes fellow with the palmetto in the transition zone which unites the vegetation of the lowlands with that of the uplands. Its stately presence—a generous shaft a hundred feet or more in height—carries with it the same solemnity which distinguishes much of our northern pine districts, and here, perhaps still more than with us, is there little or no undergrowth. We wander through a dense park, into which vistas of rare beauty open up at almost every point. Here the distant valley unfolds itself a boundless panorama; there the majestic cone of Orizaba, white with the frost of ages, towers far into the region of eternal cloudland.

I was much impressed with the general absence of animal life from these forests. We met with no large animals of any kind, and were it not for the gambols of the birds overhead, it might have been thought that absolute death had invaded the wilderness. There were no snakes—we were far above the level which marks the upper wanderings of these animals—and barely more lizards; but the latter, which we found in goodly numbers in some of the lowland regions, again became abundant higher up the mountain, where the barren rocks receive a generous supply of warm sunshine.

The paucity of insect-life was very remarkable ; it was in vain that we sought the gorgeous butterflies of tropical climes or the large gray moths of Alpine summits ; if there were any about, they kept well out of view and way. Even the joyful cicada, whose shrill notes we heard in deafening chorus along the declivities of the tableland, appeared to be here entirely wanting. Birds were, however, sufficiently plentiful, but they kept largely to the topmost branches and left their identity in many cases only to be surmised. My ornithological associates recognized the ruby-crowned kinglet, Audubon's warbler, Carolina nuthatch, creeper, western bluebird, and snow-bunting as representatives of our northern fauna. The mellow notes of the robin were sparingly heard in the lower tracts, and more rarely the song of the mocking-bird. Wherever we entered the pines from be low we were almost sure to receive a greet ing from the *Aimophila superciliosa ;* this sprightly bird keeps just without the confines of the forest, and it rarely missed the opportunity of notifying us that we had penetrated into the realm of the northern fauna. The most beautiful of the birds occurring here is the Mexican or Sumichrast's jay, which in brilliancy of plumage falls but little behind the jay we so much admired in the jungles of Yucatan (*Cissolopha Yucatanica*).

At an elevation of somewhat less than 10,500 feet we entered the belt of spruces (*Abies religiosa*), but before this we had already met with a light growth of oak (*Quercus reticulata ; Q. Orizabæ*) and alder (*Alnus acuminata*). The pine, however, still continues as the dominant form of arborescent vegetation. Flowering plants, or rather plants in bloom, were not specifically numerous, the most noticeable being a lupine (*Lupinus vaginatus*) and several species of senecio.

LA SORPRESA.
O'FARRILL.
LAMPARAS PARA MESA COLGAR Y PARED
QUEMADORES BOMBILLAS Y MECHAS.
RELOJES DE VARIAS CLASES Y AUTORES
ESPEJOS DE TODOS TAMAÑOS.
EFECTOS PARA ESCRITORIO.
PISTOLAS ALHAJAS Y LEONTINAS.
ESPECIALIDAD EN ARTICULOS
DE LUJO PARA OBSEQUIOS.
FABRICA DE
CALCETINES Y C

IN SAN ANDRES.—A SPANISH WINDOW.

The path rises steeper and steeper, and we are frequently compelled to dismount. Our poor burros, how they go panting and grunting along ! From time to time they wander off in search of a more moderate ascent, but the watchful guides permit them little latitude. At about 3 o'clock we emerged from the forest, and entered upon the broad, open divide which separates the Peak of Orizaba from the Sierra Negra. We were now at an elevation of nearly 12,000 feet, and the effects of the rarefied atmosphere had already become painfully noticeable whenever we indulged in any muscular exercise. The mounting of our animals was in itself an exertion, although not equally so to all of us, and there was manifest but little disposition on our part to lessen the burdens of our animals by walking. We had prospectively enough on hand for the morrow, and it was felt necessary to husband our strength for the grand effort so far as it was possible.

Although we were now in the open grassland, we were still far from having attained the upper limit of arboreal vegetation. To the right of us, on the bleak slopes of the Sierra Negra, and to the left, scattered in dense patches over and between the ancient lavas which here break into a veritable malpais, the eye followed for some distance farther the ascending line of forest.

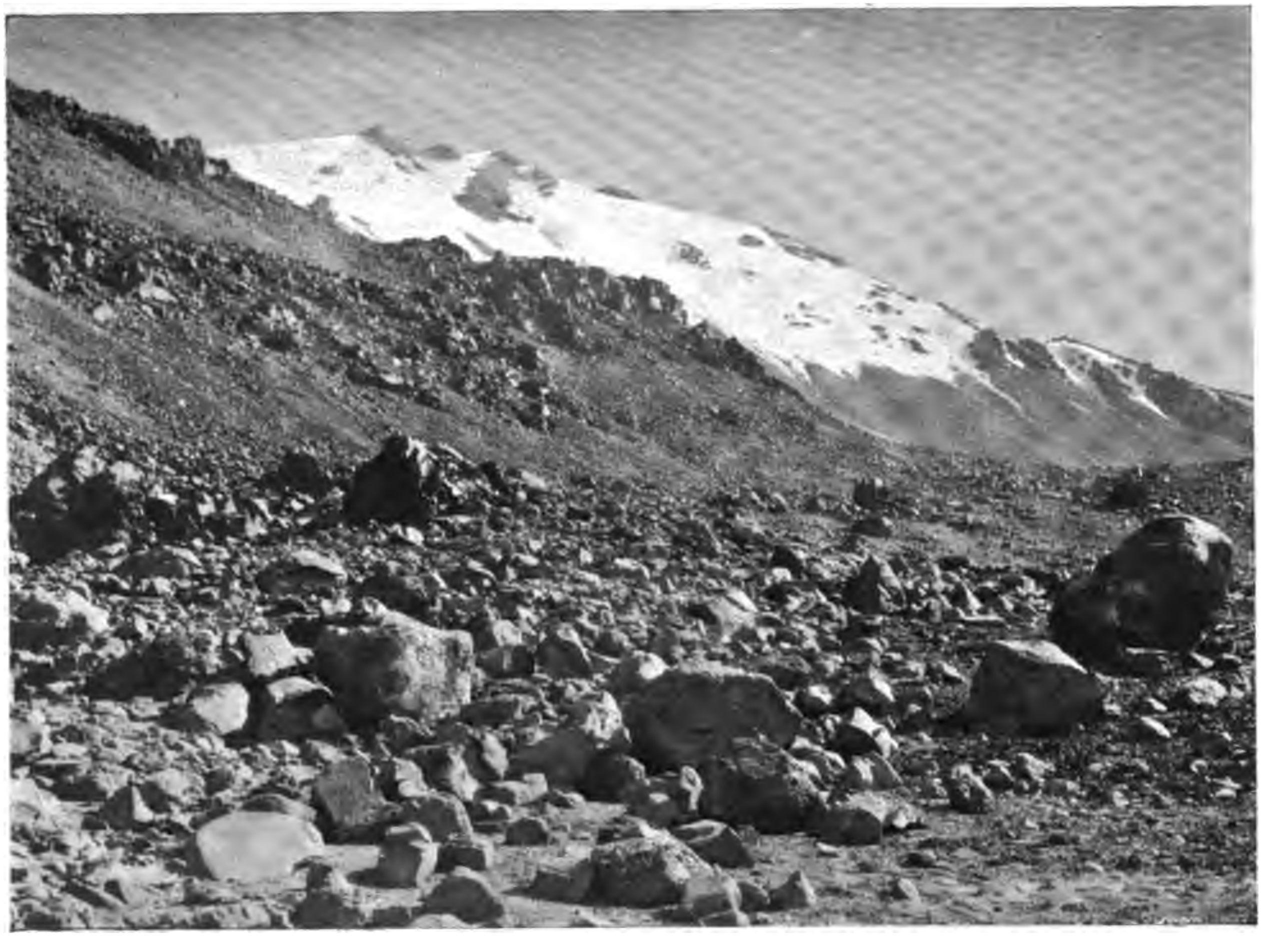
The divide between the Sierra Negra and the Peak of Orizaba offers a splendid view of the volcanoes—the one barely reaching the line of perpetual snow, and showing well the effects of long-continued atmospheric erosion—the other white with frost, and retaining the contours which were impressed upon it at about the time of the last eruption. From various parts of its flanks dark buttresses of rock stand out in vertical masses, showing where eruptions of greater or less magnitude have marked epochs in the history of the mountain. Huge outwellings of lava scar the slopes in radiating lines, but they belong in great part to a period of volcanic activity when the centre of eruption was located some little distance from the site of the present crater. We follow along the flanks of one of these lava-fields, and finally reach what is to be the halting spot for the night.

Our camping-ground consisted of a bare rock exposed to the blue vault of heaven, with a vertical lava wall on one side and a steep declivity on the other. One section of this rock, marked by a delimiting piece of timber, was intended for our weary animals, and the other, possibly the better, half for our equally weary selves. We had no tent or covering of any kind, but to the credit side of our account we marked the advantage of an elevation of 13,000 feet. Among the pastimes of the night were to look at the watch, to mark the descending progress of the thermometer, and to keep track of discomforts generally. A fair allowance of sleep could possibly have been had even under the existing conditions of cold, but the bed was hard and uneven. A mass of projecting lava would persist in making its presence known where the covering blanket was the thinnest, and there seemed always to be a space between the ribs anxious to receive such projection.

We had been advised to keep our firearms in readiness in case of a possible incursion of some wild animal. Wolves—probably the coyote—are plentiful, even at this great height, and at one time during the night their howlings were plainly audible. The cougar or puma, too, is said to be a freqent wanderer about here, but we saw none of its traces. Coyote (or wolf) tracks and dung, on the other hand, we found in abundance on the following morning, and at considerably greater elevations than the site of our camp.

It was arranged that we should breakfast shortly after four o'clock, and to break camp immediately after. About two hours before daylight I looked at the thermometer and found the mercury had descended to 28 degrees, the lowest for the night. It felt cold, very cold, and much more than the status of the thermometer warranted. But probably a given quantity of cold is felt more severely at this high altitude than in the regions below. At length the bright glare of daylight broke upon us, and the majestic form of Orizaba was revealed in its full purity. There was not a cloud visible in the great expanse of sky, and the atmosphere appeared to be of remarkable transparency. The first rays of the sun were just beginning to gild the white cap of the mountain when we were called from our bivouac, and rarely did the eye of man fall upon a more wondrous landscape than that which we, blocks of sleepy humanity, were asked to contemplate. It was an artist's moment—a moment when Science yields to her favorite sister, Art. Alas for the perversities of photographic art! I made my exposure on a plate already exposed.

The work for the day was to be one of our feet, and not of those of burros. The first part of our journey followed a trail leading through a grass country, after which we entered upon a broad, undulating expanse of soft sand. Travelers who have a personal acquaintance with recent composite cones know what it is to wade through the yielding material that covers their slopes—the slow progress, the stiffening muscles, the heavy gasps are conditions familiar to them. But we had the additional burden of an extremely attenuated atmosphere, which soon began to play havoc with us. A few steps at a time was



THE PEAK OF ORIZABA, MEXICO.
(FROM 14,000 FEET.)

all that we could accomplish without stopping to catch breath, although a few seconds' rest was sufficient to restore most of us to an apparently normal condition ; unfortunately, this condition was only apparent, for after we had accomplished another few steps we found that we were again thoroughly exhausted. It was manifest that the ascent from now on would be a continuous struggle between desire and failing strength, and that if the summit was to be reached at all, it could only be reached through an effort that would require all the resources of both mind and body.

We had attained a little after six o'clock an elevation of nearly 14,500 feet. We had left the limit of trees (the pines) nearly 1000 feet below us, and were virtually beyond the zone of grasses. But patches of grass were still occasionally with us, and a few flowering plants, a castilleja and a draba, were found yet higher up the mountain ; we plucked the last at an elevation of about 15,000 feet. Far off, through a land of haze, 100 miles or more distant, the lofty summits of Popocatepetl and Ixtaccihuatl were boldly outlined against the western sky ; the Malinche, which has gathered to its name one of the prettiest romances of Mexican lore, occupied the middle distance, while in the immediate foreground we had the long slope of the mountain which we were making such a determined effort to mount. Mr. Le Boutillier's strength had by this time nearly departed, and but a short distance farther we bade him good-bye for the rest of the day.* Probably the discomforts of the night conduced toward his early discomfiture, but the principal difficulty was the matter of respiration. Especially tantalizing in this ascent was the fact that the summit always appeared to be so near at hand ; indeed, it was not far off, since the line of ascent lay largely in a course direct to the apex. The slope was steep, some thirty degrees or more, and when progress was made it told rapidly on the height. But alas ! progress was more in the name than in the fact. An occasional spurt, adding perhaps twenty-five or thirty feet of vertical, would seem to materially increase our chances for success, and accordingly drew out new vigor for the effort. But such special efforts were always followed by a recoil which reacted painfully upon our demoralized systems. We were accordingly compelled to fall back upon the slow-and-steady system, but were only able to carry out the first (or slow) part of the programme. A steady climb was out of the question.

At noon we had reached an elevation of about 16,000 feet. We had for some time before left the sand for a ridge of lava boulders, over which we had hoped to materially lessen the labor of climbing. The snow-field already descended far below us on one side, but along our course we met with only stray cakes or patches of snow and with the layer of ice which remained permanently buried beneath a capping of volcanic débris. I took barometic observations at intervals of about every half hour, and found that we were making 300–400 feet per hour. At this rate we were still removed several hours from the summit.

We found the last traces of terrestrial animal life at about 15,000 feet, where we picked up a solitary lizard from one of the sun-warmed boulders. There were no insects—at least we failed to find any traces of their existence at this altitude. But birds were still observed and heard above us ; we thought we recognized the tit and the chickadee, and possibly a species of wren. There was no question as to the raven, whose "caw" was heard far o'ertop of us, or the sparrow-hawk. At about one o'clock we reached the ice-cap (elevation of 15,500 feet), which is here split by a ridge of rock and boulders entering far into its limits.

It is difficult to describe the sensations of this high-mountain climbing. In its physical expression it may be said to be a continuous alternation between muscular ability and muscular inability. Mentally it was a constant contest between "shall I go farther, or shall I desist?" With the great and increasing strain that was put upon us, we yet felt all right almost the very instant that we sat down to rest ; we caught new breath and everything seemed well. We were thus never in a position to definitely know our own condition, since we were constantly fluctuating between "ups" and "downs." But it was patent that after every rest our ability to do work was getting less and less, and the periods of rest were following one another in a disagreeably rapid succession. Our chances for success were becoming momentarily less, and we had only just entered upon the snow-field.

Up till now we had not passed over any dangerous places : there were no steep precipices to climb, nor broad crevices to cross. It would have been all smooth sailing but for the fatigue attending muscular exercise. But now on the snow-field extra

* To Mr. Le Boutillier's camera the expedition is indebted for the accompanying view of Orizaba.

caution would be required, and we had but little of that mental strength left which was necessary to properly guide our actions. The snow field, or more correctly ice field, was of inconsiderable development, at no point where seen by us attaining a greater thickness than about 5–7 feet. Its surface was everywhere cut up into sharp pinnacles (séracs), two or three feet in height, which, while offering safe lodgment to the feet, rendered progress exceedingly irksome. There was no soft snow, and the feet made but little impression on the crusty surface of the ice. I found the rubbers with which I had provided myself exceedingly useful, but for downhill work they were not as serviceable as the cotton swaths which the guides had fastened around their sandaled feet; they were soon worn through by the sharp edges of the ice, and before my return to the camp that evening there was little left of the soles. Still, for a single ascent they can be used with advantage, and they are in one respect preferable to the native foot-swaths—they are less clumsy.

It was now nearing three o'clock, and I felt that a crisis in our affairs was impending. We had a long journey yet before us, and the summit of the mountain was still several hundred feet away. Stone and Baker had made their final effort, and began their descent, in company with one of the guides, from a height of about 17,700 feet. Another of our guides lay far below us, incapable of proceeding farther. One of my associates had succumbed to an intense headache, and the other to a bad stomach (***mal de montagne***), possibly the result of a too free indulgence in the ice of the mountain slope. I, however, ate heartily of this refreshing substance, and experienced no ill effects from its use. The question was brought finally home to me: "Shall I follow my comrades mournfully downward, or make one last determined effort?" Below me stretched an endless panorama—a vast slope reaching into boundless space; above me, a white patch, whose limits were barely 400 feet away. I decided upon the upper route. Again I toiled onward, little able to accede to the demands of the guides, who still remained with me, to hurry my pace. It simply could not be done, even in the face of the danger signal which a rapidly advancing evening placed before me. At about 4.30 I had almost attained my goal, but the result was still doubtful. Through the assistance of a rope which was lowered down to me by one of the advance guides I managed to pull myself to the crest, and at about a quarter before five o'clock stood on the rim of the crater, 18,000 feet above sea-level.

(*To be Continued.*)

THE DISCOVERY OF AMERICA IN ITS INFLUENCE UPON THE VEGETATION OF EUROPE.

OF the many important results which have followed the discovery of America, few present a more interesting phase than that which has shaped the destinies of the European flora. Just as a large portion of the American continent has, during the four hundred years which have followed the Columbian era, become stocked with European plants—of which the ubiquitous wild carrot may be taken as a familiar example—so has during the same period the European flora received extensive accessions from the American side. The interchange of continental floras and faunas is a well-established law of biological dynamics, but it is not always easy or possible to ascertain the lines upon which the interchange has been effected, or the period or periods when it was made; in the case, however, of the interchange between the American and European continents certain precise data are to be had.

In a learned paper read before the Geographical and Statistical Society of Frankfort on the Main, Professor Jännicke enumerates some ninety species of American plants which in one way or another have been transported across the Atlantic, and become so thoroughly naturalized and acclimated over different portions of Europe, and many of them also in Asia, that they are barely to be differentiated from the native plants, and, like these, grow and develop without man's fostering care. Among such are the amaranths, one of our common species of milk-weed (*Ascle-*

pias Cornuti), several asters, the Canada flea-bane, wild strawberry, sunflower, monkey-flower (*Mimulus luteus*), a number of evening-primroses, wood sorrel, rudbeckia, the golden rod (*Solidago Canadensis, S. glabra*), blueberry, speedwell, Indian fig, and aloe. Of the cultivated forms, the potato, tobacco, and maize are the best known examples. The most broadly distributed forms, and those which show perhaps the greatest individual development, are the *Amarantus reflexus*, whose domain extends eastward to Transcaucasia and Persia; the Canada flea-bane (*Erigeron Canadense*), ranging to the Himalaya Mountains; the common evening-primrose (*Œnothera biennis*), and the so called "water pest" (*Elodea Canadensis*), which was seemingly first introduced into Ireland in 1836, but has since spread and developed so extensively as to constitute a real pest to the water courses, completely choking some of the North German canals.

Of the ninety species of plants referred to by Professor Jännicke, it would appear that scarcely any—perhaps not a single one—have effected a lodgment through simple natural causes—*i e.*, transport by currents, winds, or birds. The opinion of the eminent Swiss botanist De Candolle is sustained that the introduction was in all or nearly all, cases an accessory of man's wanderings—intentional transplanting through human effort, or accidental transport with his belongings. In view of the close passage to the American border of the Gulf Stream, and of its discharge on the West European coast, the deficiencies of a natural transport are not a little surprising, and the lesson might serve as a caution against too easily accepting views as to the means of dispersion of plants and animals. At the same time, it is by no means impossible that the early records of the first appearance of certain plants in the Old World will be found to be defective, and that a much greater antiquity attaches to some species than has been commonly assumed.

It is not a little remarkable that only two American trees—the locust (*Robinia pseudacacia*) and the common white pine (*Pinus strobus*)—should have as yet become thoroughly naturalized in Europe. As early as 1772 Du Roi had already introduced, besides the two trees just mentioned, the Canada fir (*Abies Canadensis*), sycamore or buttonwood, black walnut, cypress, juniper (*J. Virginiana*), and the arbor vitæ, and a few years later Julius von Wangenheim experimented still further with American arboriculture, but the results, except in the case of the locust and pine, have proved meagre. The robinia, on the other hand, has for two centuries or more been steadily spreading throughout Europe.

Barring the cultivated tobacco, maize and potato, there are only two North American plants which can be said to impart a distinct physiognomy to the European flora or landscape. These are the Indian fig or cactus (*Opuntia ficus-Indica*) and the aloe or "century plant" (*Agave Americana*), both of which are thoroughly engrafted into the scenery of the Mediterranean region. All travelers in the sunny south of France, in Spain, Italy and Syria, are familiar with these distinctive exotics, but probably only a few among them are aware that the plants which to-day form a "part" of the country are not natives of the region in which they are found, and that they are but a comparatively recent introduction (dating from the sixteenth century). The stately aloes of the Riviera, whose tall flower-stalks have so frequently arrested the attention of visitors to the gardens of Monte Carlo, are seemingly as much a part of the landscape as are the pines with us in the sands of New Jersey or in the bottoms of North Carolina.

There is little reason to longer doubt that the tobacco, maize and potato are distinctively American products, although opinion is by no means unanimous as to the times at, or routes by, which their Transatlantic transport was effected. It seems almost certain, however, that all three plants effected a lodgment first in Spain, whence they were rapidly introduced into other parts of the European continent. The earliest authenticated mention of tobacco in European literature is contained in a work by Romano Pane in 1511, but the plant itself does not appear to have been introduced until a full half century later. To Columbus, seemingly, we owe our first knowledge of the maize or Indian corn. At the time of the discovery of the American continent the plant was in full cultivation by the Indians, and apparently this cultivation extended as far south as the La Plata. Under its different names of corn, Roman wheat, Sicilian wheat, Indian wheat, Turkish and Egyptian wheat or corn, Syrian durrha, etc., this cereal is known throughout almost the entire civilized world, although it is by no means as yet uniformly accepted as an article of diet. Especially ingrained with the country and people is the corn in Hungary, Turkey and Western

Asia ; to so great an extent is this the case that for a long time it was held by botanists that the march of cultivation was from the east westward, and that therefore the cereal must have had originally an eastern home. The recent discovery in Mexico of a wild species of maize (*Zea canina*) definitely settles the question of origination in favor of the American continent.

It is now generally accepted that the "potato" which Drake, Raleigh and Hawkins have been credited with having introduced into England was not the potato at all, but the sweet potato or yam. Thomas Herriott, an associate of Raleigh, appears to have first brought the true potato to England about 1586, but fully fifteen years earlier the plant was already known in Spain, and ten years before in Italy. The earliest mention of it in botanical literature is contained in the "Herball" of Gérard (1597). The English word potato is manifestly a corruption of the Spanish *patata*, just as the German *Kartoffel* (frequently in the last century appearing as *Tartuffel*) is a transformism of the Italian *tartufolo* (a diminutive truffle—*tartufo*).

THE "GREAT WHITE JOURNEY" FROM THE HUMBOLDT GLACIER TO THE NORTHERN SHORE OF GREENLAND.*

ROBERT E. PEARY, U. S. N.

ON the 24th of May Dr. Cook and Gibson, who had formed our supporting party, left us to return to Redcliffe, leaving Astrup as my sole companion for the remainder of the journey. On the last day of May, from the dazzling surface of the ice-cap we looked down into the basin of the Petermann Glacier—the grandest amphitheatre of snow and ragged ice that human eye has ever seen, walled in the distance by a Titan dam of black mountains, and all lit by the yellow midnight sunlight. Still keeping on to the northward, navigating the ice as does the mariner the sea along an unknown coast, we were befogged for two or three days in clouds and mists which prevented us from seeing to any distance. As a result, we approached too near the mountains of the coast, and got entangled in the rough ice and crevasses of the Sherard Osborn Glacier system. Here we lost twelve or fourteen days in our efforts to get back to the smooth, unbroken snow cap of the interior. Once there, we continued our march, always northeastward, till on the 27th of June I discerned black mountain summits rising above the horizon of the ice-cap, directly ahead of us. Then the northwest entrance of a fjord came into view, and we could trace its course southeasterly just beyond the nearer mountains of the land north and northeast. I changed my course to east, when I was soon confronted by the land and the fjord beyond. Then I turned to the southeast, and traveled in that direction until the 1st of July, when we, after fifty-seven days of journeying over a barren waste of snow, stepped upon the rocks of a strange new land, lying red-brown in the sunlight, and dotted with snowdrifts here and there. The murmur of rushing streams, the roar of leaping cataracts from the ice-cap, and the song of snow-buntings made the air musical. Leaving the sledge and our supplies at the very edge of the rocks, leading our dogs, and with a few days' supplies upon our backs, Astrup and myself started on over this strange land, bound for the coast, which we knew could not be far distant. Four days of the hardest traveling, over sharp stones of all sizes, through drifts of snow and across rushing torrents, and we came out at last upon the summit of a towering cliff, about 3500 feet high, now known as Navy Cliff, from which we overlooked the great and hitherto undiscovered Independence Bay.

Before us stretched new lands and waters, to which, with the explorer's prerogative, I gave names, as follows : The bay at our feet, opening into the Arctic Ocean half-way between the 81st and 82d parallels of latitude, was named Independence Bay in honor of the day, July 4th ; the red-brown land beyond the fjord which had stopped our forward northward progress was called Heilprin Land ; and a still more distant land

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* From Mrs. Peary's "My Arctic Journal." Reprinted by special permission.

DRIFTED IN.

beyond the entrance of a second fjord, Melville Land. The enormous glacier at our right, flowing due north into Independence Bay, received the name of Academy Glacier, and the bold, rugged land beyond it, Daly Land.

It was almost impossible for us to believe that we were standing upon the northern shore of Greenland as we gazed from the summit of this bronze cliff, with the most brilliant sunshine all about us, with yellow poppies growing between the rocks around our feet, and a herd of musk-oxen in the valley behind us. Two of these animals we had killed, and their bodies were now awaiting our return for a grand feast of fresh meat. Down in that same valley I had found an old friend, a dandelion in bloom, and had seen the bullet like flight and heard the energetic buzz of the bumble-bee.

For seven days we remained in this northern land, more than six hundred miles of pathless icy sea separating us from the nearest human belng, and then we began our return march. This return march, much shorter than the upward one, was uneventful and monotonous. For about two weeks we were about a mile and a half above the sea-level, literally in the clouds, and day after day, in every direction, stretched only the steel-blue line of the snow-horizon. The snow was soft and light, and without our "ski," or Norwegian snow-skates, and Indian snow-shoes we should have been almost helpless in it; but at last, after passing the latitude of the Humboldt Glacier, when we were only about a mile above the sea-level, the traveling became better. The slight down-grade assisted us, and for seven days we averaged thirty miles a day, increasing our distance on each successive day, showing that both men and dogs were in perfect training, and, like the scientific athlete, had still the reserve force necessary for a grand spurt on the home-stretch.

The night of the 5th to the 6th of August was an exquisitely clear and perfect one. From eight to eleven Astrup and myself and our remaining five dogs toiled up the north slope of the largest of the ice-domes between the head of McCormick Bay and the edge of the true interior ice—one to which I had given the name "Dome Mountain." As I rose over the crest of the great white mass and looked down and forward upon our course, there, some two miles away, upon the slope of the next dome, were two or three dark, irregular objects. Even as I looked at them they moved and separated, until I could count several detached bodies. They could be but one thing—men; and as there were so many of them, and as I was sure that none of the Eskimos could have been persuaded by my boys to set foot upon the inland ice, I knew in an instant that some ship was lying in the bay waiting for us. It was but a little while later, both parties descending rapidly toward each other, that we met in the depression between the two domes, and I grasped again the hand of Professor Heilprin, who had been the last to say good-by to me a year before, as I lay a cripple in my tent, and who now had come again to meet me and bring us back. It was a strange and never-to-be-forgotten meeting. In the ship lying at anchor at the very head of the bay I found the woman who had been waiting for me for three months, and two days later we were back again in the little house which had sheltered us through a year of Arctic vicissitudes.

Such, in brief, is the outline of the inland-ice journey from McCormick Bay to the northern shore of Greenland and back. Its important results are already well known, and it is not necessary to revert to them here. I will attempt, however, to give some adequate impression of the unique surroundings in which our work was done, and also to make clear the real character of this great interior ice-plateau, a natural feature so entirely different from any with which we are acquainted in better-known portions of the globe that I have sometimes found it difficult to convey, even to the most cultivated minds, a really adequate conception of what the great ice-cap is like.

The terms "inland ice" and "great interior frozen sea," two of the more common names by which the region traversed by us is generally known, both suggest to the majority of people erroneous ideas. In the first place, the surface is not ice, but merely a compacted snow. The term "sea" is also a misnomer in so far as it suggests the idea of a sometime expanse of water subsequently frozen over. The only justification for the term is the unbroken and apparently infinite horizon which bounds the vision of the traveler upon its surface. Elevated as the entire region is to a height of from 4000 to 9000 feet above the sea-level, the towering mountains of the coast, which would be visible to the sailor at a distance of sixty to eighty miles, disappear beneath the landward convexity of the ice-cap by the time the traveler has penetrated fifteen or twenty miles into the interior, and then he may travel for days and weeks with no break whatever in the continuity of the sharp, steel-blue line of the horizon.

The sea has its days of towering, angry waves, of laughing, glistening white-caps, of mirror-like calm. The "frozen sea" is always the same — motionless, petrified. Around its white shield the sun circles for months in succession, never hiding his face except in storms. Once a month the pale, full moon climbs above the opposite horizon, and circles with him for eight or ten days.

Sometimes, though rarely, cloud-shadows drift across the white expanse, but usually the cloud-phenomena are the heavy prophecies or actualities of furious storms veiling the entire sky; at other times they are merely the shadows of dainty, transparent cirrus-feathers. In clearest weather the solitary traveler upon this white Sahara sees but three things outside of and beyond himself —the unbroken, white expanse of the snow, the unbroken blue expanse of the sky, and the sun. In cloudy weather all three of these may disappear.

Many a time I have found myself in cloudy weather traveling in gray space. Not only was there no object to be seen, but in the entire sphere of vision there was no difference in intensity of light. My feet and snow-shoes were sharp and clear as silhouettes, and I was sensible of contact with the snow at every step. Yet, as far as my eyes gave me evidence to the contrary, I was walking upon nothing. The space between my snow-shoes was as light as the zenith. The opaque light which filled the sphere of vision might come from below as well as from above. A curious mental as well as physical strain resulted from the blindness with wide-open eyes, and sometimes we were obliged to stop and await a change.

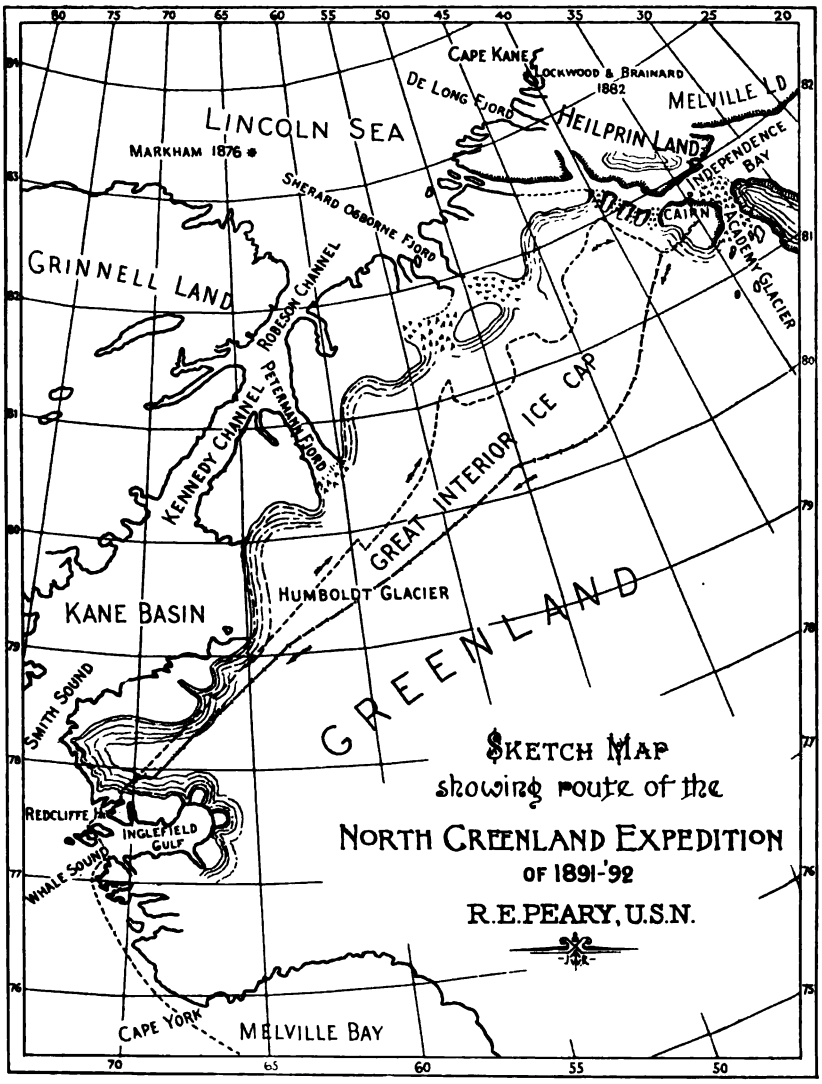
The wind is always blowing on the great ice-cap, sometimes with greater, sometimes with less, violence, but the air is never quiet. When the velocity of the wind increases beyond a certain point it scoops up the loose snow, and the surface of the inland ice disappears beneath a hissing white torrent of blinding drift. The thickness of this drift may be anywhere from six inches to thirty or even fifty feet, dependent upon the consistency of the snow. When the depth of the drift is not in excess of the height of the knee, its surface is as tangible and almost as sharply defined as that of a sheet of water, and its incessant dizzy rush and strident sibilation become, when long continued, as maddening as the drop, drop, drop of water on the head in the old torture-rooms.

While traversing the inland ice our hours of marching were those corresponding to what here would be night—that is, when the sun was above the northern horizon. In our line of march I took the lead, on snow-shoes or ski as the condition of the snow demanded, setting the course by compass or by time, and the shadow cast by my bamboo staff. The dogs, a few yards in the rear, followed my trail, and Astrup traveled on ski beside the sled, encouraging the dogs and keeping them up to their work.

Our daily routine was as follows: When the day's march (measured sometimes by the hours we had been on the move and sometimes by the distance covered) was completed, I began sounding the snow with the light bamboo staff to which my little silken guidon was attached, until I found a place where it was firm enough to permit of blocks being cut from it. This done the guidon-staff was erected in the snow and at the shout of "Tima" from me, my dogs, no matter how long or how hard the day had been, would prick up their ears and come hurrying up to me until they could lie down around my feet, glad that the day's work was done.

As soon as the sledge came to a standstill I read the odometer, aneroid, and thermometer; then Astrup and myself undid the lashings, and as soon as the lines were loose Astrup took the saw-knife and began excavating for our kitchen, while I took the short steel-pointed stake to which we fastened our dogs and drove it firmly into the snow in front, and some fifty feet to leeward of the kitchen site. I then untangled the dogs' traces, detached the animals from the sledge, and made them fast to the stake. I next got out a tin of pemmican, a can-opener, and a heavy hunting-knife, and kneeling behind the sledge, prepared the dogs' rations, which consisted of a pound of pemmican each. I then fed the hungry creatures, standing over them meanwhile with the whip, to see that the weaker ones were not deprived of their share.

By this time Astrup had completed an excavation in the snow, about eight feet long by three feet wide and a foot and a half deep, and with the snow-blocks obtained from this excavation had formed a wall a foot and a half high across one end and half-way down each side. Across this wall was put one, and sometimes both, of the ski, and over this was spread a light cotton sail, weighted down with blocks of snow. This was known as our kitchen, and at the innermost end was placed the



kitchen-box, containing our milk, tea, pea-soup, Liebig's extract, drinking-cups, can-opener, knives, spoons, and the day's rations of pemmican and biscuit ; also the alcohol-stove and a box of matches, done up in a waterproof package.

Then, if it was Astrup's turn as cook, he immediately began the preparations for dinner by lighting the alcohol-lamp and filling the boiler with snow, while I lay down in the lee of the sledge and made my notes of the day's work. If it was my turn as *chef*, as soon as the kitchen was finished I took possession of it, and Astrup retreated to the shelter of the sledge. While the snow was melting I wrote up my notes, Astrup usually devoting this time to rubbing vaseline into his face to repair the ravages of the sun and wind. As soon as sufficient water had been melted, two cupfuls of pea-soup were made, and this, with a half-pound lump of pemmican, formed our first course. While we were enjoying this, the water for our tea was brought to the boiling-point. Pea-soup and pemmican finished, we each had a cupful of cold milk, and when this had disappeared the tea was made ; six biscuits apiece formed our dessert.

When our luxurious repast was over, what was left of our day's allowance of alcohol was allowed to expend itself on a fresh boilerful of snow for our morning tea, while the cook made his preparations for the night by changing his footgear and tightening the drawstrings of his furs. In addition to his other duties, the cook of the day had the entire responsibility, from dinner-time until breakfast, of the dogs, and it was the first rigid regulation of the journey that he should always be so dressed that he could at a moment's notice jump from his shelter and capture a loose dog. The dogs were always fastened directly in front of the opening of the kitchen, so that the occupant, by raising his head, could see at once if his presence were needed. During the first portion of our journey this duty was an onerous one, and frequently meant a sleepless night; but later on, after several of the dogs had received some severe discipline for attempted thefts, and particularly after we had adopted the plan of muzzling them every night as soon as they had finished their dinner, we had but little trouble.

LEWIS AND CLARK AS AMERICAN EXPLORERS.

THE criticism is at times made that the American people, with all the energy that distinguishes them, and with a special thirst for discovery, have added but few names to the list of the world's eminent explorers. The criticism is in a measure a just one. Barring the adventurous wayfarers to the Arctic realm, toward a knowledge of which the American flag has done more than the flag of any other nation with the exception of that of England, the century's famous explorers of this side of the Atlantic can well nigh be counted on the fingers of a single hand. The illumination of the African continent is associated with the names of but two American travelers of note—Du Chaillu and Stanley—if indeed they can be properly considered Americans; in Asia Rockhill stands virtually alone; in Australia the pages of exploration show a blank; and in South America the record is opened and closed with the narratives of Herndon and Gibbons on the Amazons, and of Commander Page on the La Plata.

It has been contended in extenuation of this condition that the American possessions were in themselves so vast, and the knowledge regarding them until a comparatively recent period so limited, that all the energy of exploration resident in our people was required for a home-study rather than for the study of foreign lands. It may be doubted, however, if this explanation will satisfy the inquiring mind. Rather, it would appear that the American people have not taken kindly to exploratory work, any more than they have taken kindly to book geography in the schools and colleges. Sporadically a bright name appears to adorn the page of geographical work accomplished, but its *lumen* only intensifies the black void through which it marks a passage.

The most brilliant chapter in the history of American exploration is unquestionably that which is marked by the adventurous expedition of Captain Meriwether Lewis and Lieutenant William Clark in the first decennial of the present century. That which is known as the "Lewis and Clark Expedition," undertaken with a view of exploring the Missouri River and its principal tributaries, and of determining an advantageous route across the continent to the Pacific Ocean, has generally passed to fame as a chapter of American history. There are few people who know the continent of to-day who can properly appreciate the difficulties of that remarkable journey — a journey of thousands of miles through a largely unbroken wilderness, over mountain ranges buried beneath a heavy mantle of snow and ice, and across the domain of savages, whose ferocity was only less great than that of the wild animals with which they were associated. With the aid of a modest appropriation by Congress of $2500 for the purposes of the expedition, the two gallant young officers, in company with their associates and a military escort, to the number, all told, of forty-three, set out on their perilous journey. On the 14th of May, 1804, they began the ascent of the Missouri River; near the close of July of the following year they reached the head confluents of that stream, which they named the Jefferson, Madison and Gallatin; on the 15th of November they arrived at the mouth of the Columbia River, and on the 23d of September, 1806, once more reached the heart of civilization in St. Louis. The mission had been successfully accomplished, and accomplished in a way which was creditable alike to the leaders of the exploration and to the administration by whom the expedition was fostered, and under whose direction it was outlined. Despite privation of the severest kind, it would appear that good feeling prevailed among the little band of adventurers at all times during their wanderings of upward of two years, for sixteen months of which communication with the civilized world was completely cut off. It is little to be wondered at that in those early days of American freedom, with an expedition heralding the conquest of "new lands beyond the sea," the return of the exploring party was the occasion of the expression of joy throughout the country; and to no one did the success come more welcome than to Thomas Jefferson, the friend of Lewis and the special promoter of the expedition. Jefferson, in a biographical notice of the chief of the expedition, writes : "Never did a similar event excite more joy through the United States. The humblest of its citizens had taken a lively interest in the issue of this journey, and looked forward with impatience for the information it would furnish."

The record of this expedition, owing to unfortunate circumstances surrounding the publication of the official narrative, has until this year been but indifferently given to the world. We owe to Dr. Elliott Coues* that amplification of the narrative —known as the Nicholas Biddle or Paul Allen publication—which places in its true position one of the most daring and most brilliant explorations executed during the present century. With the instincts of the true historian Dr. Coues has gathered together all the important data bearing upon this expedition, and has so far annotated the original material of the narrative as to bring it within the compass of a full memoir, open to the scholar and scientist of to-day, and penetrable to the searching light of the most modern criticism. Reviewing the original narrative, the modern historian writes : "The more closely it is scrutinized in the light of our present knowledge, the more luminous it appears. The severest tests which contemporaneous criticism can apply serve mainly to develop its strength and worth."

The full quality of the expedition is thus summed up by the able commentator : "Lewis and Clark's expedition from the Mississippi River to the Pacific Ocean was the first governmental exploration of the 'Great West.' The history of this undertaking is the personal narrative and official report of the first white men who crossed the continent between the British and Spanish possessions. When these pioneers passed the Rocky Mountains, none but Indians had ascended the Missouri River to the Yellowstone, and none had navigated the Columbia to the head of tide-water. The route was from Illinois through regions since mapped as Missouri, Kansas, Iowa, Nebraska, South Dakota, North Dakota, Montana, Idaho, Washington and Oregon. The main water-ways on the Atlantic side of the mountains were the Missouri and Yellowstone ; on the Pacific side Lewis's River, the Kooskooskee, and the Columbia. The Continental Divide was surmounted in three different places, many miles apart. The actual travel by land and water, including various side-trips, amounted to about one-third the circumference of the globe. This cost but one life, and was done without another serious casualty, though often with great hardship, sometimes much suffering, and occasional imminent peril. The discipline of the party was perfect. The comparatively youthful and inexperienced captains developed the qualities of ideal leaders, dauntless, resourceful, indefatigable, vigilant, absolute in command, solicitous for the welfare of their men, and imposing no privation unshared by themselves. . . . . The story of this adventure stands easily first and alone. This is our national epic of exploration, conceived by Thomas Jefferson, wrought out by Lewis and Clark, and given to the world by Nicholas Biddle."

It may be stated that Dr. Coues does not share the views of Jefferson and of the earlier historians as to the cause of Lewis's death—namely, suicide, developed through hypochondria—but inclines to the theory, which has latterly been carefully elaborated by James D. Park, of Franklin, Tenn., that the Governor was murdered for the purpose of robbery, the deed having been accomplished at a wayside inn, known as "Grinder's" or "Griner's," in what is now Lewis Co., Tenn., two miles west of the county-town of Newburgh.

WINTER ROUTES OF TRAVEL.—THE GULF BORDER.

FEW regions of the earth's surface more thoroughly combine the elements which help to make a country attractive than the region of the Gulf of Mexico. Indeed, if we except the Mediterranean, it may be doubted if there exists any other which so directly satisfies the lover of nature, at the same time that it appeals to the more studious and earnest mind—the mind searching after new and obscure facts. From barren sunlit rocks, that have only latterly been brought into existence through organic agencies, to the sombre depths of the tropical primeval forest, from mountain deserts to volcanic summits rising high above the level of perpetual snow, there is presented almost every phase of nature that is to be found between the Arctic and the Equatorial zones. It is true that the region still remains largely untouched by those qualities of civilization which have built up the lovely sites on the Mediterranean, and have spread over that region a pleasurable comfort which is only with difficulty to be found in our own sunny South. It is equally true that on that account the charm of travel has by no means been lessened — indeed, to many it has thereby been rather increased.

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* **History of the Expedition under the Command of Lewis and Clark.—Francis P. Harper, New York, 1893.**

Until within a comparatively few years the pleasure-seeker to the Gulf region restricted his musings almost entirely to the southern tier of States of the Union, to the Bahamas, and to Havana. The quiet, forest-grown waters of the St. John's and Ocklawaha, the coral strands of Nassau, and the quaint Spanish corners of the Cuban capital, had attractions of their own which, when combined with qualities of climate, were sufficient to attract from year to year a steadily increasing number of winter residents to their sunny haunts. The western and southern borders of the Gulf region, although easily accessible, received, however, but little attention, as did likewise the chain of minor islands of the Lesser Antilles, whose long linear curve so suggestively outlines a former connection between the southern and northern continents. Yet it is certain that much of this debarred region is among the most picturesquely delightful that is to be found in the entire South; and it is difficult, even from the point of healthfulness, to comprehend why it should have been so long neglected. The towns of Jalapa and Orizaba, in Mexico—both of them situated at elevations exceeding 4000 feet, and at distances of only a few hours from Vera Cruz—are true garden-spots, free from the malarial influences of the low sea-border, and charmingly attractive in their tropical characteristics. Neat and clean as comparatively few Mexican towns are, with accommodations for the traveler that can be considered fairly satisfactory, they appeal to all lovers of nature's grandest scenes—to all to whom a change of scene, an introduction to new manners and customs, and a freedom from acquired conventionalities are a fruitful source of health-giving pleasure. It is true that tradition has invested the Mexican border region with an unhealthfulness which facts have only too truly confirmed; and guidebooks to-day warn the traveler approaching the Mexican coast against tarrying at the port of entry (Vera Cruz), and urging an immediate traverse to the lofty tableland beyond. Yet it is certain that the lowland itself has largely lost its terrors of fever and pestilence; indeed, in the winter season—which might be said to include the months between November and May—with a due regard to conditions of sanitation and food-supply, little need be feared. The consular reports clearly indicate that there has been a very rapid decline in the annual death-rate depending upon yellow fever—so much so, that in some years there has been scarcely a single fatal case reported. The official report of Consul-General Sutton, dated June 17, 1890, and referring to the port of Tampico, says: "The health of this port has greatly improved, as has that of Vera Cruz, within recent years. During the past nine years the [Mexican Central Railroad] company has maintained offices at Tampico, and none of its officers have died or suffered any severe illness. The president's report also states that no case of yellow fever has been known in that vicinity during that time."

Within the Mexican realm, and easily accessible to the steamers which weekly touch the Yucatan coast at Progreso, are some of the most interesting ruins that are to be found, not only upon the Western continent, but upon the entire surface of the earth. The famous marble piles of Uxmal, with their great Casa Gobernador and sacrificial mound, are barely a day's journey off the beaten path of travel, and yet how few are the travelers who have seen these wonderful remains of a departed race, or who know that they can be reached from a port of entry with much the facility that the Adirondacks can be reached from Lake Champlain! A wrong knowledge of the country and of its inhabitants—the wholly fallacious supposition that the Maya Indians of that region are savages, and that a pestilential climate lurks about the "jungles" of Yucatan—is, doubtless, mainly responsible here, as are similar beliefs in Mexico proper, for withdrawing from the traveler's gaze some of the most interesting regions that can anywhere be reached.

It is unfortunately only too true that to many, perhaps most, minds the "tropics" convey the idea of a region lying just outside the borders of what is supposed to define health, vigor, and comfort, and that it is to be shunned at all times with a terror akin to that which faces a pestilence. Personal contact or experience can probably alone eradicate this feeling, and traveling will more rapidly perform this function than any other means.

THE LAGOONS AND ISLANDS OF THE BERMUDAS.

THE BERMUDA ISLANDS AND THE WONDERS OF THEIR CORAL REEFS.

SIX hundred miles almost due east of the city of Charleston lies the group of small, hillocky islands upon which, with full appropriateness, has been bestowed the name of the "Pearl of the Atlantic." Washed by an off-flow from the Gulf Stream, they are linked by conditions of climate with the sub-tropics; in reality they are in the heart of the Temperate Zone, from other lands in which they differ in almost every particular. A hasty glance at these islands shows limestone rock covered with a not over-luxuriant vegetation. Dark masses of Bermuda juniper, scattered through an otherwise almost lifeless expanse of green, and recalling the cloud-shadowed patches of our northern lands, relieve a generally sombre landscape—cemetery-like in its tombstone flecks of white cottages. This is the distant aspect, when the eye has just begun to discern the tufts of palmetto whose gray-white trunks are bunched against the hillsides. The ocean has still its true ocean-color, differing little from the great expanse of sea the world over.

When the traveler has reached the shadow of the mountlets of wind-rolled sand—there is no elevation in the Bermudas exceeding 260 feet—the scene gradually changes: the waters are no longer of ocean-color, but of streaks of the most intense indigo and emerald green, so sharply defined and so wonderfully unnatural to the untutored eye that the mind hesitates to accept the scene that is placed before it. The luminosity and transparency of the water, with its reflecting base of white coral sand, are intense, and the eye beholds a charming panorama of the life that is contained within it. Corals of bright orange and yellow, sponges of black and cardinal, nodding sea-fans of purple and silver, and fishes of all that brilliancy of coloring which distinguishes the ichthyic element of the coralline seas—these and much more are the pictures that appeal invitingly to a habitation in the oceanic waste. Over all float lazily by hundreds—nay, thousands—of sporting jelly-fishes—the aurelia, Portuguese Man of War, and many other forms—whose quiet evolutions are from time to time broken into by the dart of the flying-fish or the flash of that sainted bird, the Tropic.

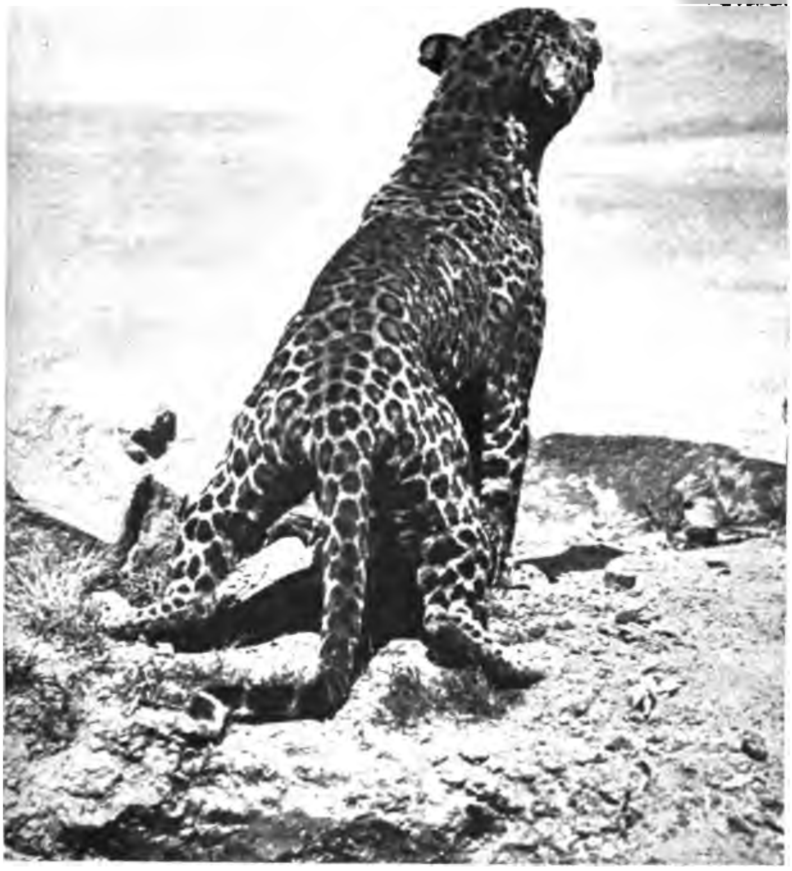
The inner waters, beautiful as they are, are, however, but a feeble reflex of the wonderful landscape of the outer reefs. No one who has not before seen a growing reef can have any true conception of the wealth and gorgeousness of the life that here carpets the floor of the sea only a few feet from the surface. No meadow of temperate or tropical lands, with all that exuberance of plant growth which a bountiful nature has provided, no fabric of human manufacture, representing the genius of the western and eastern worlds, can excel in variety and brilliancy of coloring the carpet of "sea-plants" which an industrious animal life has built up. With rapturous delight and wonder we gaze through the crystal waters, and follow the infinitude of form that everywhere surrounds us. The eye rests but for a moment on one object; it is immediately called to another. Corals, sponges, squirts, and lime secreting algæ are welded together into one vast wilderness of coloring—a carpet-mosaic of the most bizarre pattern and brilliancy. All animal life is out in holiday attire: the crabs, the shells, the worms, are painted with the same brush and palette which were used in frescoing the corals and sponges, Red, green, yellow, and purple blotches appear everywhere, and so finely are they interwoven that the outlines of the elementary parts lose themselves in the body-mass of the whole. Thus has nature provided her weaker offspring with a protective coloring, and allowed them to live almost unobserved amid the haunts of their enemies.

The predominant forms of Bermuda corals are the porites and brain-stones (*Mæandrina*, *Diploria*), both of them of an exquisitely brilliant orange-color when living. Only when the outer skin has been removed through the death of the organism does the coral present that white skeleton which is familiar to all in museum or mantel specimens. In growth the hard stone is enveloped in a thin cuticular mass, from which project the tiny polyps which together make up the coral individual or colony. The brain-stones, especially those of the secluded waters, such as Castle Harbor, are of gigantic size, some of them four or five feet, or even more, in diameter. Like huge buttons or mushrooms they lie scattered about; in other places they are so compactly packed together as to suggest a causeway of giant cobblestones. Wherever living they are entirely submerged in the water, and their lower limit does not appear to extend much below the twenty-foot line. Few of the Bermudian corals grow in any profusion beneath this depth, and no species appears to find a habitation beyond 60 feet.

On the outer reef, which is well seen at Chubb's Cut, and to still greater advantage at the group of rocks, known as the North Rock, which, nine miles from the main island, mark the former extent of the Bermudas, the coral masses are largely honeycombed, partly the result of the wearing and tearing action of the oceanic billows, but mainly the work—just in what manner accomplished is not yet known—of a large, ebony-black sea-urchin known to naturalists as the *Diadema setosa*. This singular creature, with its armature of long, delicate, needle-like spines, is one of the distinctive features of the life of the growing reef, just as the great outstretched and slowly-meandering sea-cucumber distinguishes the fauna of the inner waters.

To one unfamiliar with the workings of the coral animal, apart from the surpassing beauty of the scene, there is nothing very wonderful about a coral-reef. To the geologist and zoologist, however, it is one of the most remarkable of all structures. The conception of great boulder-masses being built up through the agency of thousands upon thousands of tiny polyps is itself one that cannot fail to arrest the mind of every thinking person; but how feeble is this conception to that which pictures entire islands—nay, barriers hundreds of miles in length—built up through the same slow process of animal accretion! The Bermuda Islands represent such a structure.

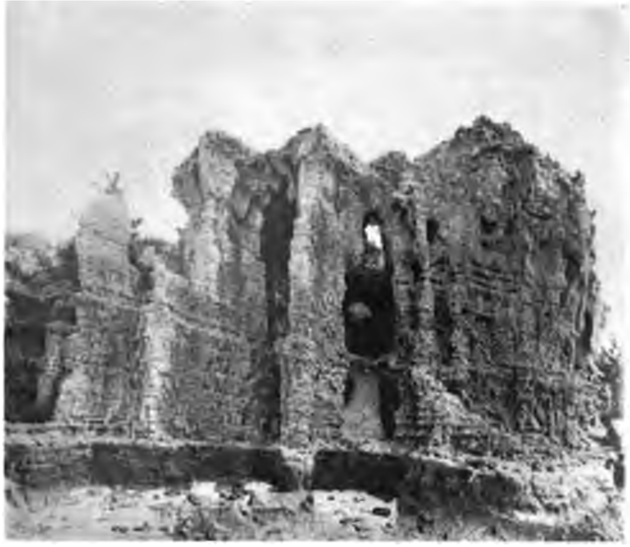
Few localities offer equal advantages to the study of the growing reef; the ready accessibility of the islands, the presence of large bodies of sheltered water, and the facility with which the surf-portions of the reef may be reached, combine to make the region an almost exceptional one from the point of view of the student. From almost any eminence on the islands the eye can clearly mark out the limits of the archipelago. The long line of breakers which parts



LEOPARD HOWLING.
(PHOTOGRAPHED FROM LIFE.)

the blue waters of the outer world from the more nearly green within is virtually the boundary of the little island-world. It is there, exposed to the beating action of the surf, and in the path of the currents which supply the growing colony with the greatest amount of food-supply, that the most active work of the polyps is being carried on. From a depth possibly of a few yards below the surface they have built quite up to it, and upon their work the sea is expending its full powers of destruction. The war between the organic and inorganic forces is waged in the path of the beating and seething foam; it is here that life asserts her supremacy over the sea, and it is here that the sea maintains her right of domain as an inheritance of prior birth. Blocks of coral and coralline are detached and broken, their parts are rocked to and fro in the withering crest, and ultimately, when the fragments have been sufficiently punished by the sea, they are handed over for further chastisement to the action of the wind. In this way the particles are ground finer and finer, a true sand is formed, and dunes begin to rear their heads above the ocean-level. Thus is laid the foundation for the "land above the sea"—the land that is ultimately to develop into a world of its own, to be inhabited by new animals, to be covered by new plants.

Traveling in the line of the wind, the dunes pass onward, climb over one another's backs, and comb the gently-flowing crests; from pigmy hillocks they rise into well-fashioned knolls, and ultimately stand as the eminences which to-day are the Bermudas. No one who, on the south shore, has watched the great tongues of moving sand—the sand-glaciers of Tucker's Town and Elbow Bay, for example—stealthily encroaching upon the hilltops of the interior, and burying everything, in the manner of the locusts of South Africa, beneath their mantle of destruction, can have failed to be impressed by the character and magnitude of the work that is being accomplished.



WEATHERED ÆOLIAN ROCK, BERMUDA.

Everywhere throughout the Bermudas we find evidences of this singular rock-formation. Fragments of broken coral and coralline occur all through the island-rock, and no large rock-mass occurs anywhere whose origin cannot be directly traced to the organic forces. The work of "rearing" the islands was, however, accomplished ages ago, at a time remote enough to have permitted many of the animal-forms which first stocked the newly-forming land, coming from the West Indian seas or from the east coast of the United States, to have so far modified their habits and structure as to be recognizable as distinct species. Yet, geologically speaking, this so-called ancient period was a comparatively modern one.

When the land was completed it extended continuously from what is now the south shore to the North Rock; the big lagoon, with its unproductive sands and patches of bristling corallines, was a part of the land-surface. The animal forces had gained upon the sea, and wrested from it a future possession. To-day the scene is different: through a slow subsidence of the foundation upon which the islands have been built, the sea has been permitted to encroach upon the land; the hills, that had been wearily built up, are being gradually cut down and washed back into the oceanic abyss; the connected land-mass has been cut through into islets, and between them lagoons have been formed. How long this destruction will continue, and how profound may be its effects, cannot in the nature of things be foretold; but it might continue until all the islands are awash.

The inquiring mind naturally asks, "On what foundation do the islands rest?" Reef-building corals rarely flourish at greater depths than 60–100 feet—more commonly their active work ceases at about 20–30 feet—and water of a depth of thousands of feet surrounds the islands on all sides. The coral animals, by reason of their restriction to the upper zone of the ocean, could not have built them up from this depth; they could, however, readily have built upon a towering projection from the bottom, and possibly—indeed, one might say, not improbably—such a substructure is a volcanic cone, extinct and now slowly subsiding into the sea. The fact that twenty miles to the southwest of the Bermudas two banks, representing possibly other volcanic peaks, come to within 20–50 fathoms of the surface, and that only seven miles from the outer reef on the north side soundings have indicated the very extraordinary depth of 12,000 feet—giving for the Bermudian substructure an average rise of one foot in three—argues in favor of this supposition. Drained of its surrounding waters, the Bermudas would, when viewed from the north side, appear like a stupendous tower, in comparison with which the principal mountain elevations of the land would, so far as abruptness of slope is concerned, sink into insignificance. In a number of volcanic peaks of the land, however, we have almost just such a slope.

A BERMUDIAN ROADWAY.

In all the facts that the Bermudas present they clearly uphold the Darwinian doctrine of coral-reef formations. The argument for subsidence is well borne out not only by the outward encroaches of the sea, but by the existence of stalagmitic caves—such as the beautifully embowered and fairy-like cave of Joyce's Dock, whose floors are now depressed considerably below the level of the sea—and the discovery on Ireland Island of peat deposits, holding erect the stumps of cedars, at a depth below the water-line of 45-50 feet. On the other hand, the islands present no evidence of any uplift having taken place in the region since the period of the last subsidence.

The Bermuda Islands of to-day, which, together with their contained lagoons, cover an elliptical area of some 220 square miles —by far the greater part of which is water —present largely identical features. Gently undulating hills, rising sometimes with the symmetry of sugar-cones, alternate with broadly open lowland, and pleasantly diversify the landscape. Under the influence of a genial and balmy temperature—the mercury in the shade rarely rising to 88° F., and but exceptionally descending to 50° —has developed a vegetation which is in part American and in still greater part essentially Bermudian. The native arboreal vegetation consists almost wholly of the scrubby juniper and the sabal or palmetto, but the introduction of a number of other palms, such as the date, cocoanut, and cabbage-palm, and of the bamboo, fig and India-rubber, which seemingly thrive with all the luxuriance that is permitted in a native home, combined with the broad cultivation of the banana and plantain, imparts a more distinctively tropical aspect to the region than properly belongs to it. Of the common deciduous trees of the north, such as the oak, birch, beech, maple and poplar, there is scarcely a trace to be seen, nor is there anything to replace them. An occasional sycamore, mulberry, or weeping-willow still reminds one of the Temperate Zone, but beyond these and the Bermuda juniper there is little suggestive of the woods barely six hundred miles distant.

At intervals bits of delicious tropical nature surprise one: warm and sunshiny patches of palm-land, largely overgrown with the coarse bracken, and bordered by almost impenetrable thickets of banana and plantain, fall refreshingly upon the eye that has perhaps become satiated with the juniper and sage (*Lantana*), or even with the oleander. O'er hill and dale, far and near, in the garden and along the roadside, this superb bush scatters its fragrance to the winds. For one who has not seen the rose-flowered oleander in its native home, or in this land of its adoption, it is impossible to conceive of the effect which is produced by the great masses of showy blossoms which appear here, there, and everywhere throughout the landscape. The hedges are ablaze with their blossoms and buried in perfume; the roadways are similarly bejeweled and scented. This is the special glory of the Bermudas.

ANIMALS IN NATURE.--THE LEOPARD.

OF the many spotted cats of the world, none has so large a distribution as the form which is commonly designated leopard or panther, the ***Felis leopardus*** of naturalists, whose range extends throughout the greater part of the African continent and all the warmer tracts of South Central Asia, from Palestine to the Malay Archipelago. Whether or not more than one species of animal is included under this name, or whether the closely resembling forms, depending for their individuality mainly upon changes of coloration, are merely varieties of a common specific type, are questions which the naturalist has not yet been able to answer to his full satisfaction.

While the weight of opinion probably favors the view expressed by one of the ablest anatomists of our day, the present Director of the British Museum, Sir William Flower, that the common large cat of Asia, the panther, is specifically identical with the African leopard, or at most is only a variety of that species, it is but proper to acknowledge that one of the keenest observers in the field, the late Dr. Brehm, took an opposite view. In general habit, not less than in its color-markings, the two forms were held to be distinct, and to be as clearly differentiated from one another as are the leopard and jaguar. Under this classification the leopard is distinctively an African animal, while the panther is Asiatic.

The leopard ranks as the fourth largest representative of the cat family, giving precedence to the lion, tiger and jaguar. Less powerful than any of these, it holds a certain superiority over them in the possession of rare cunning and an agility of movement which is probably unsurpassed among the larger animals of the world. At home among the tree-tops and on the floor of the forest, among rock-fastnesses and on the desert sands, no domain can be said to be foreign to it, and no land-animal free from its gaze. Its point of attack is everywhere, and its retreat the entire land. While the lion has, with no very great difficulty, been exterminated from Algeria, the most determined efforts directed against the leopard have thus far failed to bring about in its case a similar result; imbued with a bold and restless nature, it continues its depredations to the very gates of the larger cities; indeed, at times it will not hesitate to venture within the cities themselves. Bloodthirsty to a degree that is not even approached by the tiger, and knowing no fear, the animal is a perpetual menace in the line of its wanderings. Treacherous to the last degree, it has very largely baffled all attempts at domestication or taming, although it is certain that the Romans were in a measure successful in this work.

It is a singular fact that while dogs, even those best trained to the chase, can only with great difficulty be made to approach a lion, they most readily attack the leopard, just as they do the tiger, unequal though the contest very often is, and very generally suffer from their indiscretion.

In common with nearly all the larger cats, the leopard is generally assumed to be a strictly tropical animal. This is not the case, however, for the range of the animal, whatever might be its predilections for a warm or torrid climate, extends far into the Temperate Zone, reaching, indeed, well nigh to the Siberian frontier, if not across it. The tiger itself is surprisingly abundant in some of the mountain tracts of southern Siberia, while a close relative of the leopard, the ounce or irbis, is known to extend its mountaineering exploits among the Himalayas up to an elevation of 14,000 feet, and has been frequently observed to cross the snow-fields of that region. As is also true of the jaguar, the leopard shows a decided tendency in the direction of melanism, and a black form is frequently found described in works of natural history as a distinct species.

While nothing positive is known regarding the primal home of the leopard, there is reason to believe, as in the case of many of the larger African mammalia, that it is of central Asiatic or Indian origin, and that its appearance on the African continent was the result of a westerly migration, effected by way of Europe or over the desert sands of Arabia. Certain it is that the animal was in a recent geological period an inhabitant of Europe, over which it roamed at least as far as the fifty-second or fifty-third parallel of latitude. In the British Isles its remains are recorded from the deposits of the Mendip Hills. Even as late as the Roman period the leopard, probably in association with the lion, hunted amidst the fastnesses of the Balkan Peninsula.

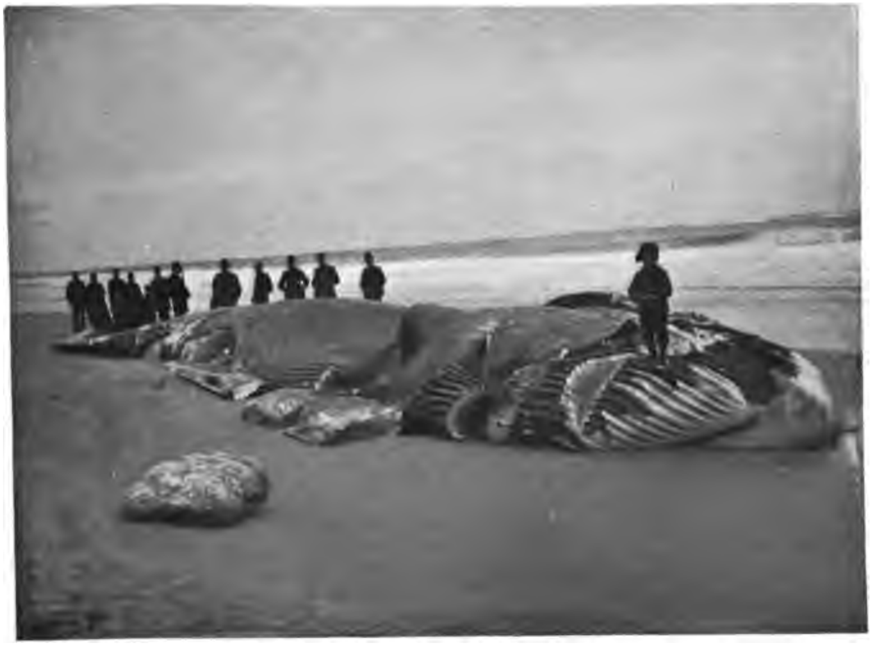
THE SOURCE OF THE CONGO.

THE Belgian explorer, Lieut. Franqui, in a recently published communication addressed to the Geographical Society of Antwerp, makes clear the relations of the upper waters of the Congo. The Luapula, which has its source on the highlands separating the basins of Lakes Tanganyika and Nyassa, is, as has already been indisputably shown by M. Delcommune, the parent stream of the great West African river. As such, rising on about the tenth parallel of south latitude—almost due south of the discharge of the Alexandra Nile into the Victoria Lake—it flows southwestward, ***rounding***, but ***not traversing***, Lake Bangweolo, whence it flows northwestward, joining the Lukuga—an eastern affluent from Tanganyika—and with it the water that is afterward known as the Lualaba. Lieut. Franqui calls attention to the fact that the dimensions of Lake Bangweolo are exaggerated on nearly all maps, only the northern part of the waters so represented belonging properly to the lake; the southern portion is merely an inundation sheet of the Luapula, which flows near by.

In its entirety the Congo and its tributaries drain an area estimated at 1,200,000 square miles, or approximately that which is drained by the Missouri-Mississippi system of waters, and about one half of that which is drained by the Amazons. The length of the main stream, however, barely exceeds 2500 miles, which would place it about eighth in rank among the rivers of the globe.

A MONSTER OF THE ATLANTIC COAST.

IN the month of October, 1891, there was stranded on the beach of Ocean City, Cape May County, New Jersey, probably the largest monster that has ever been recorded from the west Atlantic coast. The specimen—a fin-back whale—measured from the tip of the snout to the hinder border of the tail sixty-six feet and eleven inches, or very nearly the largest size that is recorded for any specimen of the whale tribe to be found in the world's museums. Some conception of the prodigious size of this animal can be had from the circumstance that forty-four persons stood alongside of one another on the carcass at one time. The dimensions of the individual parts of the animal were in conformity with the dimensions of the entire frame. The curve of the jaw, measured from the median junction to the angle of the mouth, was 16 feet 10 inches; length of the flipper along the median line, 7 feet 4 inches; width of the tail across the flukes, 14 feet 10 inches. What was no less remarkable than surprising in this monster was the fact that a number of the cervical or neck-vertebræ had not yet had all their parts completely co-ossified—a condition that would seemingly indicate immaturity on the part of the animal. This was the conclusion reached by so eminent an authority as Professor Cope, who made a careful study of the subject. If really immature, the animal is by far the largest representing that condition which is known, although not fully-grown whales of 40–50 feet are not uncommon.



THE WHALE OF OCEAN CITY, N. J.

What species of whale is represented by the Ocean City specimen has not yet been clearly determined. A careful study of all its characters, surface and skeletal, indicates a relationship with two well-marked forms of fin-back—that which is known as the common fin-back (*Balænoptera musculus*), and the Sibbald's whale (*B. Sibbaldii*), holding an approximately intermediate position between the two. With the first-named it agrees in the form of the head, in the number of the vertebræ and ribs, and in the disposition of the fins; from it, again, it differs—agreeing in this respect with Sibbald's whale—in its prodigious size, the general surface-coloring, and in the structure of the cervical vertebræ. From both of these species it differs in the number of the bones of the fingers of the hand.

What unfortunate condition of existence brought the animal to the shore could not be determined. That it was dead when it reached the shallows is certain, and it seems not unlikely, from some jarring which appeared on one side of the head, that the monster was the victim of a steamship collision on the high seas. The so unexpected appearance of what is seemingly a new species of giant whale in the Atlantic waters is a warning that cannot be neglected in the discussion of what may or may not yet be discovered among the faunal elements of the sea. The animal in question has been secured by the Academy of Natural Sciences of Philadelphia, in whose museum it will form a fitting supplement to the already extensive collection of cetacea.

NOTES.

The Royal Geographical Society of London, at their last anniversary meeting, awarded the Patron's Medal to Mr. W. Woodville Rockhill, formerly of Philadelphia, for his explorations in Western China, Koko-Nor, Tsaidam and Tibet, and for his researches into the ethnology of those regions. This is the eighth award to Americans, in a period of sixty years, of one of the royal medals of the Society—the others being to the Rev. Dr. E. Robinson, of New York (1842), Col. (Genl.) John C. Frémont (1850), Elisha Kent Kane (1856), Professor Alexander Dallas Bache (1858), Dr. Isaac I. Hayes (1867), Henry M. Stanley (1873), and Major (Genl.) A. W. Greely (1886).

Mr. Clements R. Markham, the present President of the Royal Geographical Society of London, in a recently published paper on the life and discoveries of Columbus, makes the following positive statement regarding the landfall: "The spot where Columbus first landed in the New World is the eastern end of the south side of Watling Island. This has been established by the arguments of Major and by the calculations of Murdoch beyond all controversy. The evidence is overwhelming. Watling Island answers to every requirement and every test, whether based on the admiral's description of the island itself, on the courses and distances thence to Cuba, or on the evidence of early maps. We have thus reached a final and satisfactory conclusion, and we can look back upon that momentous event in the world's history with the certainty that we know the exact spot on which it occurred—on which Columbus touched the land when he sprang from his boat with the standard waving over his head."

Dr. Rae, one of the heroes of Arctic exploration, passed away during the past summer. He was eighty years of age, and continued in excellent health until within a few months of his death, which took place on July 22d. Dr. Rae began his Arctic service in 1846, and continued it through a period of fifteen years or more. He first solved the mystery surrounding the fate of Sir John Franklin and his companions, finding many relics of the gallant officers who stuck to their duty, and who, as described by an Eskimo, "dropped down as they walked and died." The first announcement of the discovery of these relics was made in a communication addressed to Sir George Simpson, the then Governor of the Hudson's Bay Territory, and bearing date (Repulse Bay) of July, 1854. For this service the British Admiralty awarded him a grant of £10,000. Dr. Rae was an ardent sportsman and an indefatigable walker, and it is claimed that he covered on foot not less than 23,000 miles in the course of his Arctic wanderings.

Another effort to reach the forbidden "holy" capital of Tibet, Lhassa, will be made this year by the Swedish geographer Sven Hedin, with a caravan starting from Leh. The route will follow that of the Pundit Nain Singh as far as the Tengri Nor, whence Hedin, disguised as a Persian merchant, will with a single companion attempt that which has so often been frustrated before. Like Rockhill, who made the latest, but an unsuccessful, attempt to reach the city, Hedin is well prepared for his arduous task through an efficient knowledge of the languages of the country.

Prof. A. H. Sayce, the distinguished Egyptologist and Oriental scholar, in a paper published in the July number of the *Asiatic Quarterly Review*, expresses doubts as to Mount Sinai having been situated in what is now known as the Sinaitic Peninsula, and therefore believes that the latter term is a misnomer. He identifies the "Yam Suf" of the book of Exodus (the Red Sea of the Bible) as the Gulf of Akaba—the northeastern horn of the Red Sea—and he is inclined to look for Mount Sinai "on the borders of Midian and Edom, among the ranges of Mount Seir, and in the neighborhood of the ancient sanctuary of Kadesh-barnea, whose site at Ain Qadis has been rediscovered in our own day."

Around the World.

VOL. I. FEBRUARY, 1894. No. III.

A COURT-GARDEN IN JALAPA.

A GARDEN SPOT OF MEXICO.—A REMINISCENCE.

A single day at Vera Cruz will satisfy the average traveler. Let him then betake himself sixty miles away to quaint Jalapa, among the foot-hills of that rugged crest, the Cofre di Perote, or Nauhcampatepetl, which, from an elevation but little below that of the upper snows of the Jungfrau, looks down upon forests of pine and oak, of melastomes and palms—over broad and desolate areas of blistered lavas, luxuriant tropical jungles, and lastly the distant blue waters of the Gulf. Everything about you is verdant, the vegetation of that rich green which could seemingly under no conditions be otherwise than green. In the not distant south, soaring the better part of four miles aloft into the sky, is the ice-cone of Orizaba, turned to you with that face which Humboldt considered the most perfect of any mountain-form in the world. It would, indeed, be difficult to find a site more charming than that occupied by this old-fashioned, up-and-down-hilled "suburb" of Vera Cruz. Scarcely less large than the city to whose wealthy inhabitants it ministers the benefits of cool mountain breezes and the sunshine of oaks, vanilla and coffee, Jalapa departs almost entirely from the type of Mexican town which is represented by Vera Cruz. In the first place, it is an essentially clean city, like Orizaba and Toluca. The steeply-graded streets could hardly permit it to be otherwise, for down their slopes the rains sweep with the intensity of mountain torrents, gathering up and removing everything lying in their paths. Unfortunately, such rains are only too abundant, and it is a pity that the condition which has provoked the cry of *Ave Maria purissima, que venga el sol*, cannot properly be delegated to some other and more needy town. But to this excess of moisture is due the luxuriance of vegetable growth—the garden of Jalapa.

The Jalapeños, unlike the Vera Cruzanos, assist nature in the cleansing process : the houses, as well as the open streets, are clean, and seemingly there is a desire on the part of the inhabitants to make the town appear as cheerful as possible. Coming from such an uninviting spot as Vera Cruz, it is really a delight to wander up and down these irregular streets, with their old-fashioned Spanish houses, bright with color and sunlight, and joyous in the display of flowers and merry faces. The characteristic Mexican awning hangs out over the green verandah, but behind it it is not difficult to recognize the watchful deity who assumes for herself an invisibility not necessarily disguised. The custom for women to sit behind a curtain or awning and watch the doings of those about has pervaded all Mexico ; for hours at a time they are occupied solely with the melancholy (shall one rather say cheerful?) work of scanning the streets and sidewalks, seemingly with no other object than to lose or kill time. This feature of Mexican life is certainly one of the curses that oppose progress, but, like all other institutions of a sun-governed country, it is not likely to be soon eradicated.

Jalapa is noted throughout the land for its beautiful women, and, with certain limitations, it certainly justifies the saying : "Las Jalapeñas son halagueñas." The limitations are, however, those of the point of view. To say that the women are bewitching is merely to state a proposition which is formulated from the Mexican point of view —*i. e.*, the women of Jalapa are beautiful as compared with other Mexican women, which is, after all, saying very little. With perhaps two or three exceptions, I observed not a really handsome face, albeit the time of observation was a favorable one—a glorious Sunday afternoon, inviting alike to the verandah and to the promenade. The main street, especially toward sunset, was thronged with the merry multitude, and in the evening, when the band took possession of the little *zocalo*, or central garden, a continuous and solid procession marked time to the strains of some of the most pleasing music that it was my good fortune to have ever heard.

We regretted exceedingly that the limitation of time did not permit us to explore more thoroughly the wonderful region about Jalapa. Woodland and mountain combine to make it a region of no peace to the traveler, while to the naturalist they offer an endless feast. The botanist can here revel in a wealth of orchids, while at the same time he is enjoying the deep shade of evergreen oaks, and is about to grasp the pines. From the deep barrancas, with their palms, bananas, and bamboos, to the moss-covered slopes beneath the snow, he has but the trespass of a few thousand feet. The locally famous, but to the world as yet almost unknown, falls of Naulinco—a series of falls and cascades tumbling through some 600 to 800 feet—are but a few miles to the southwest, and like most of the falls of the Mexican Republic, combine many of those special features of the landscape which add such a charm and warmth to the scenery of the tropics.

Jalapa, as a suburb—if so it may be called—of Vera Cruz is accessible to the sun-beaten inhabitants of that city by two main routes of travel—the steam railway (only recently opened for the entire course) and the mule-tram, starting from San Juan. No more delightful journey by rail can be undertaken than the one behind the mules on the longest tram line in the world. Up hill and down valley, through the scatterings of primeval forests and across blistered lava-fields, with luscious fruits and bright flowers starring the road of travel, the voyager is rushed over his course with the velocity of the Russian post. The journey of sixty miles is accomplished in from six to seven hours, or at an average rate of nearly ten miles an hour, the rate of travel being approximately twice that of the fast-running lines of the American cities. Five or six changes are made in the course of the route, and a full hour is allowed for the mid-day siesta and refreshment. Fleet though the journey may be, the reminiscence is a lasting one.

PHYSICAL CHARACTERISTICS OF HAWAII.

THE Hawaiian or Sandwich Islands are characterized by certain peculiarities of physical construction which, to the inquiring mind, mark them as among the most interesting regions of the earth's surface. Situated upward of 2000 miles from the nearest continental land-mass—the western coast of the United States—and about an equal distance from the nearest groups of large islands, the Marquesas and Samoan Islands on the south and the Aleutian Islands on the north, they are, as Mr. Wallace has well defined their position, "wonderfully isolated in mid-ocean." Their closest neighbors are a series of scattered coral-reefs and atolls, hundreds of miles distant, nearly all of which are destitute of both animal and vegetable life. Rising from a depth of water of some 18,000 feet, and being entirely of volcanic construction, except where coral-reefs have added their masses to assist in the work of development, they give evidence of having been isolated, as they now are, for a very ancient period, a supposition that is well borne out by their faunal and floral peculiarities—the broad variation of the animal and vegetable forms from the types of the continental areas.

The Hawaiian group, which has a linear extent of approximately 350 miles, is composed of eight inhabited islands and a number of small rocky islets; by far the largest of all these is Hawaii, covering an area of about 4100 square miles—somewhat less than the area of Connecticut—which supports the two giant volcanoes, Mauna Loa and Mauna Kea, the latter now seemingly extinct, and the former the most stupendous of all active volcanoes. Rising as they do to elevations of upward of 13,700 feet, they are, in fact, when measured from their true bases at the bottom of the sea, the loftiest of all known mountains, overtopping Mount Everest, of the Himalayas, by 1000 or 2000 feet. Captain Dutton, who a few years since made an official survey of the region on behalf of the United States Geological Survey, thus describes the appearance of the twin volcanoes:

"Mauna Loa—the 'Great Mountain'—is certainly the king of modern volcanoes. No other in the world approaches it in the vastness of its mass or in the magnitude of its eruptive activity. There are many volcanic peaks higher in air, but they are usually planted on elevated platforms, where they appear as mere cones of greater or less size. Regarding the platforms on

A RECENT LAVA FLOW IN THE SANDWICH ISLANDS.

which they stand as their true bases, the cones themselves and all the lavas which have emanated from them never approach the magnitude of Mauna Loa. Ætna and all its adjuncts are far inferior; while Shasta, Hood, and Rainier, if they were melted down and run together, would fall much below the volume of the island volcano. . . .

"Mauna Kea—the 'White Mountain'—is also a colossus among volcanoes, and, in truth, I do not recall another in the world which is equal to it in magnitude, except its neighbor, though possibly Mount St. Elias* may be nearly so. The summit of Mauna Kea is a trifle higher than that of Mauna Loa, but its slopes are steeper, and its base is therefore much smaller. The magnitude of Mauna Loa is due chiefly to the great area of its base, which is nearly elliptical in shape, with a major diameter of seventy-four miles and a minor of fifty-three miles, measured at sea-level."

To conceive of the vastness of such a volcano, one has but to picture the base extending over an area covering about seven-eighths of the distance between New York and Philadelphia. So gradual, however, is the slope of such a volcano that it from no point impresses one as being of very great height, although actually rising the better part of three miles out of the sea. The gradient is reduced to the exceedingly low angle of between three and eight degrees, or the equivalent of a rise of from five to 13 feet per hundred. So great have been the outwellings of lava from these two giant volcanoes and from Hualalai (8300 feet) that a great portion of the island is barely more than a desert waste of clinkers and lava-beds, over whose surfaces a vegetation is only here and there beginning to show signs of appearing. Mr. Scott Wilson, an English naturalist who recently visited the islands with a view to ornithological studies, gives the following picture of the island vegetation:

"Most parts of the interior are thickly wooded to an elevation of about 6000 feet, above which the ohia trees become mere scrub, and other forest-trees disappear entirely. Certain districts, even of the interior, as for instance, the vast grassy plains of Waimea, have been entirely denuded of wood, partly through the ravages of feral cattle, partly through fires and other causes quite independent of volcanic action, so that the forests occupy at the present time but an inconsiderable extent of this island. Moreover, the existing wooded region is becoming smaller year by year, owing to the countless herds of cattle which roam through its depths and have already so thrown it open that the impenetrable jungle of Hawaii is a thing of the past. It is to be feared that if no check is put to the depredations of these destructive animals, and if trees are not planted to replace the great tracts of mighty giants, which, in certain districts, are dying by hundreds, the forests of Hawaii will, at no distant date, become a matter of history."

The principal forest trees of Hawaii—indeed the only forest trees that are deserving of mention—are the koa (an acacia), which flourishes at elevations of 3500–5000 feet, the candle-nut (*Aleurites triloba*), and the myrtaceous ohia (*Metrosideros*). The last-named is the "Queen of Hawaiian forest-trees, often attaining a height of from 90 to 100 feet, with a bole large in proportion. These giants are generally encircled to the greater part of their heights by a climbing tree (*Freycinettia arborea*), which seems literally to coil around them, while its scarlet-tufted bracts and showy red fruits add yet another shade of color. . . . The ohia attains its greatest size in the lowest forest zone, from 1100 to 2500 feet, but it is to be found as high as 6000 or even 8000 feet. It well deserves its specific name, as one would at first hardly recognize the stately forest giant as belonging to the same species as the low-growing stunted shrub found in the mountain region, were it not that these bushes, dwarfed as they are, are often a blaze of crimson flowers, being more floriferous than the forest trees." The undergrowth is largely made up of the sandal wood, a rose-apple, and "numerous species of gigantic tree-lobelias and the huge tree-ferns, which latter are often over twenty feet in height and four to five feet in circumference, the dark-brown stems and feathery fronds adding greatly to the beauty and tropical aspect of a Hawaiian forest. . . . One must not pass over the numberless creepers which, especially in the lower and damper forest-zone, hang in festoons from tree to tree, and thus form a complete network of graceful greenery. Nor must one omit to make mention of that most graceful of Hawaiian ferns, *Gleichenia Hawaiiensis*, to the tangled masses of which is due the impenetrability of parts of the forests on the Sandwich Islands, and especially on Lauai, which

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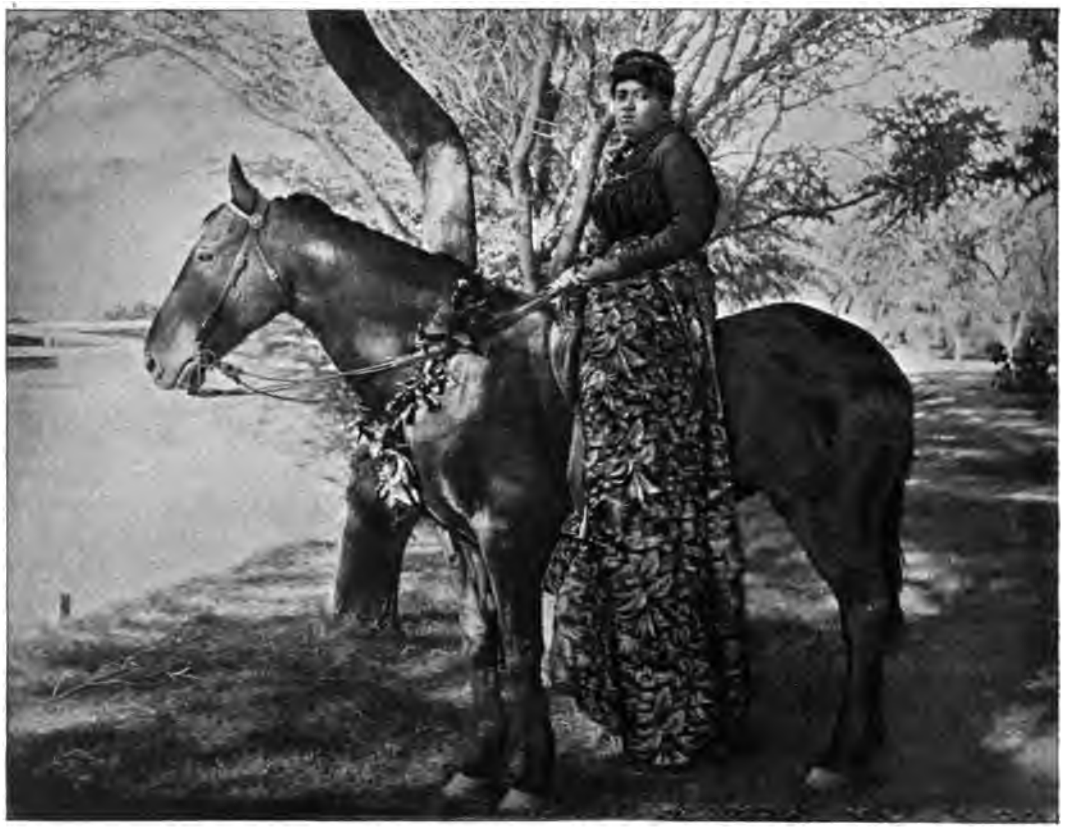
* Mount St. Elias has since been shown not to be a volcano.



HAWAIIAN HORSEWOMAN.

SUPPLEMENT TO THE ARTICLE ON HAWAII.

The *Almanach de Gotha* for 1894 furnishes the following statistical information regarding the Hawaiian Islands:

The population of the eight inhabited islands, whose total area is computed at 6,609 square miles, or somewhat less than the combined areas of Connecticut and Delaware, was at the close of 1890 almost exactly 90,000, of whom 34,436 were true Hawaiians, 21,119 whites, 15,301 Chinese, 12,360 Japanese, and somewhat more than six thousand of mixed stock. The white population was distributed as follows: 8,602 Portuguese, 1,928 Americans, 1,344 English, 1,034 Germans, 227 Norwegians, 70 French, 419 of other nationalities and 7,495 children of foreigners. It is estimated that in the month of July, 1892, the population had increased to 96,075. The immigration in 1891 amounted to 7,536 people, the emigration to 3,037. Honolulu, the capital city, numbers somewhat over 23,000 inhabitants.

The entry of vessels for the year 1892 indicated the arrival there during that period of 204 vessels bearing the American flag of 32 English vessels, and (besides some other craft) of only five German vessels; the island merchant marine comprised in 1891 a total of 51 registered vessels, of which 24 were steamers. There are to-day four lines of railroad in operation two of them on the main island of Hawaii—together aggregating a line of rail of nearly sixty miles. The first line of telegraph was established on the island of Maoui in 1878, with a length of forty miles, but it has since been carried all over the island. Supplemental to the telegraph is a closely connected telephone system, which places the different points of the main islands in ready communication with one another.

The present republican form of government dates from the 17th of January, 1893.

possesses but few feral cattle. . . . In some few favored spots, the broad-leaved banana rears its stately head, and here, in these sheltered spots, its grand leaves are perfect in their beauty, not torn to ribbons by the blustering wind, as one sees them around Honolulu and in other exposed positions. Among other fruits found in the lower forest-zone are the prolific guava, the orange and the mango, on the fruits of all of which in their season certain birds delight to feed."

Referring to the rapid destruction of the forests, and the resulting extermination of their interesting bird-fauna, Mr. Wilson thus laments the impending catastrophe: "I feel sure that all intelligent residents will agree with me that these beautiful islands, well-named the Paradise of the Pacific, would lose much of their charm were their native birds, conspicuous for the brilliancy of their plumage, and remarkable from their peculiarities, to be replaced by the noisy mynah, the pugnacious sparrow, and the Singapore dove, all of which introduced species have already obtained a firm footing on the island of Oahu, and now fill its wooded ravines, formerly the home of far rarer and more beautiful species. . . . It would be a disgraceful thing if such a Garden of Eden should be bereft of its birds, more especially as I am convinced that these islands have a great future before them as the great health resort for the inhabitants of San Francisco, flying from its unhealthy and treacherous climate, to say nothing of the vast number of tourists who will flock, in yearly-increasing numbers, to see the volcanic wonders of Hawaii, from all quarters of the globe."

QUEEN LILIUOKALANI.

By reason of their extreme insularity—following the condition of oceanic islands generally that lie beyond the line or possibilities of animal migration—the Hawaiian Islands are exceedingly deficient faunally, especially among the higher forms of animals, and such types as they maintain are largely peculiar to the islands. There are no native quadrupeds of any kind, and, excepting birds, there are of vertebrates only a few species of lizards. Nearly all the perching birds are species that belong exclusively to the islands, and even the broad types which they represent are primarily Hawaiian. These have, however, been largely encroached upon by foreign intruders, many of which have proved themselves victors in the struggle for existence. Hence, the native avi-fauna has been steadily decreasing in numbers and, indeed, a number of species have seemingly become entirely extinct during the period of the last half century, or since the visit to these islands of the Wilkes's Exploring Expedition.

The most interesting faunal element of this far-removed land is a species of honey-sucker—a bird known to naturalists as the *Mohoa nobilis*—from the yellow feathers of which, and of the still more beautiful yellow feathers of the now extinct *Drepanis Pacifica*, have been prepared those wonderful feather cloaks of ancient Hawaiian royalty, the ***mamo***, which, as pieces of apparel, are "as magnificent and beautiful as anything that the triumphs of civilized art can now produce." Their construction is thus described: "The ground-work is of coarse netting, to which are attached with skill, now impossible to be applied, the delicate feathers, those on the border being reverted. Its length is four feet, and it has a spread of eleven feet and a half at the bottom, the whole having the appearance of a mantle of gold." It is contended that the great yellow war-cloak of Kamehameha I. had been forged through the reigns of eight preceding monarchs. Its value has by some been placed at not less than $150,000.

There is reason to believe, although the fact has not yet been satisfactorily demonstrated, that the Hawaiian Islands are planted on an area of extensive subsidence in the floor of the ocean. Apart from other considerations, this condition might be inferred from the circumstance that extensive extravasations of matter from within and below must conduce to the formation of extensive voids; and where the support is not sufficient, these voids will necessarily, through overweighting, become fixed as localities of depression. Whether or not the 18,000 feet submergence in the sea of the Pacific volcanoes is an index of long-continued subsidence over such-formed voids is a most interesting question to the physiographer, but unfortunately the inquiry is of a nature which admits of but little positive testimony being obtained in its behalf. On the other hand, it is by no means impossible that both Mauna Loa and Mauna Kea have been built up to their stupendous heights from the deep ocean floor.

HAWAIIAN VEGETATION.

AMONG THE WORLD'S HIGHEST MOUNTAINS.—AN ASCENT OF ORIZABA (*Continuation*).

ANGELO HEILPRIN.

THE moment that I had safely reached the summit of the mountain I began to recover strength, and in two or three minutes had completely forgotten fatigue and that there was any but a normal condition of atmosphere about me. All difficulty of respiration had disappeared. I was troubled with none of those special accompaniments of high-mountain travel, such as bleeding of the ears, eyes or nose, swelling of the limbs, etc., which more particularly the "old masters" among travelers have so delighted to chronicle. The rest of my party were equally free from them. In the few moments that were left to me on the summit I had time barely more than was necessary to take a photographic view of the crater, and to record the readings of the barometer and thermometer. The former indicated an atmospheric pressure of only 15.56 inches, but I subsequently found that there had been a drop of one tenth of an inch during the ascent of the mountain; this would give as the true pressure of the atmosphere, 15.66 inches. The thermometer registered 35° Fahrenheit, and it was neither cold nor windy.

To describe the view from a mountain, which on one side descends without obstruction to a depth of eighteen thousand feet, and on all other sides falls off ten thousand, is a task which repels by its magnitude. I have wandered among the peaks and pastures of the Higher Alps, among the barren crags of grey Carpathia; I have watched with rapture from my eyrie on the Juras the last rays of a winter sun gilding the wonderful panorama of the Mont Blanc; and from the summit of Vesuvius have I looked down upon lovely Campania and o'er the blue Mediterranean, its bays, its islets, its promontories. The views are each and all wonderful, sublime, but none can approach the view from Orizaba. Some may be grander in their masses, more imposing in their terrors, or more soothing in their colors, but the view from Orizaba is all that majesty implies. It is a view of creation—all creation.

At 5 o'clock, a little more than twelve hours after leaving camp in the morning, the order was given to descend. We rapidly plunged and tumbled through the wilderness of séracs, anxious to cross the snow-field before darkness had set in. Less accustomed to this work than the ***niveros***, and to ensure additional safety in case of falls, I allowed a stout rope to be tied around my body, by which I was held in a sort of pendulum tow. But the numerous slips and falls succeeded one another so rapidly in our mad descent that the compression of the body, incident to the tightening of the rope, became quite unbearable, and I was compelled to take to the more primitive method of back-sliding. At length we reached the borders of the ice, and entered upon the precipitous slope of sand and boulders. Here I was treated to a novel bit of experience for which I had not calculated. Among the impedimenta which the Indians had carried to the summit were a number of straw mats (***petates***), which had already been made useful in various ways—as sleeping-mats, packers, etc. Now they were to be converted into articles of conveyance. Bundled securely into one of these, with an Indian pulling in front and another guiding behind, I abandoned myself to the pleasures of this, to me, new mode of locomotion. But the early bliss of sleighing through the sands was changed to woe when the sand itself changed to rock-fragments of the size of cobble-stones; the larger blocks were still to come, and I felt as though I were substituting for the power of a crushing mill. I may be pardoned for having conjured up visions of "devil's rides" and "devil's race-courses," toward the conception of which the dark night held out its helping hand. After seemingly grinding to powder millions of boulders over a down-course of some 1300–1500 feet, not to mention a portion of clothing, we arrived at the base of the slope and immediately struck for the path which we had followed in the morning. A little after eight o'clock we arrived in camp, having completed a remarkable round of mountain climbing of fifteen consecutive hours.

By most alpinists, probably, the ascent of the Peak of Orizaba would be considered a no very difficult undertaking. There are, from bottom to top, no precipices to climb, no impending ledges to crawl around or over, no glacial ice-fields to travel. In this respect the mountain agrees with Popocatepetl, while it differs largely from Ixtaccihuatl. The slope from the plateau base to the summit is pleasingly gentle and uniform, and the traveler who is bent upon making the attack requires merely a staff, proper foot-gear, and a good constitution. A healthy pair of lungs, cooperating with an equally healthy heart, is a ***sine qua non*** of a successful issue. To a mountaineer possessed of this equipment the ascent becomes merely a matter of endurance. From this point of view, therefore, it is easy; but, after all, endurance in mountain climbing is just as positive an element as is a steady head in scaling a precipice, or a firm step in climbing a glacier. It is not practicable always to differentiate and properly estimate the kinds of difficulties which one encounters in a mountain ascent: the result, only, fixes relatives values. The number of failures in the case of the mountain under consideration perhaps most definitely determines the position in the scale of difficulty.

It is a general belief throughout much of Mexico that the Peak of Orizaba has never been ascended, a belief that has grown out of the supposition that the actual summit is unattainable. We find this notion not restricted to Mexicans alone, and even such an experienced traveler as Mr. Ober gives credence to it. But it is certain that the volcano had been ascended on at least four occasions prior to our visit, although never before by a naturalist. It would appear that the first to reach the summit were Lieuts. Reynolds and Maynard, of the United States Army, who made the ascent in May, 1848, shortly after the close of the Mexican invasion. Their determination of altitude gives 17,819 feet, or three hundred feet less than my own measurement.

The experiences of mountaineers differ so widely as to the ill-effects or discomforts which, in regions of high altitude, arise from, or are associated with, the decreased atmospheric pressure, that it is scarcely possible as yet to define the malady (if so it may be designated) within the terms of an antidotal treatment. Indeed some travelers would lead us to believe that there is no malady or "trouble" at all, beyond what is directly attributable to the simple condition of excessive muscular exercise.

Thus, W. W. Graham, who, with Emil Boss and Ulrich Kauffmann, of Grindelwald, Switzerland, attained probably the highest elevation on the earth's surface that has as yet been reached by man, asserts his belief that "supposing the actual natural difficulties to be overcome, the air, or the want of it, will prove no obstacle to the ascent of the very highest peaks in the world." Neither on the Kabru, in the knot of the Kinchinjunga Himalayas, at an elevation of nearly 24,000 feet, nor on other peaks somewhat less elevated, did this determined mountaineer experience "any inconvenience in breathing other than the ordinary panting inseparable from any great muscular exertion." Headaches, nausea, bleeding at the nose, temporary loss of sight and hearing, were conspicuous only by their absence, and the only organ perceptibly affected was the heart, whose beatings became very pronounced, quite audible, whilst the pace was decidedly increased.

On the other hand, Humboldt, who later mounted on Chimborazo to an altitude of some 19,000 feet, while making the ascent of Pichincha was seized, at an elevation of approximately 14,700 feet, with most violent stomachal pains and an overpowering giddiness, from which he sank to the ground insensible; and it is well-known that a peculiar feeling of lassitude, or ***laissez tranquil*** condition, already attacks many tourists to the plateau of Mexico, where the elevation is less than 8000 feet.

The ablest discussion of this subject is contained in the "Travels among the Great Andes of the Equator" of Mr. Edward Whymper, wherein the author shows by overwhelming testimony that a mountain trouble (***mal de montagne***)—apart from simple difficult respiration due to a deficiency of oxygen in the atmosphere—does exist, and seeks to prove that it is the result of an inequilibrium of external and internal (within the body) pressures, dependent upon the changing conditions of the atmosphere. That this sickness, in its different expressions of nausea and vomiting, lassitude, nose and ear hemorrhages, headaches, etc., affects different travelers with different degrees of intensity, cannot be questioned; and equally little can it be questioned that certain persons are almost entirely free from its attacks. Humboldt and Bonpland, in their famous ascent of Chimborazo, in June, 1802, both experienced the distress of ***mal de montagne*** (nausea, giddiness, accompanied by bleeding of the lips and gums) at elevations of 17,000 to 19,000 feet; and nearly eighty years later (December 1879), on the same mountain, the experienced alpinist, Edward Whymper, and his two Swiss-Italian guides, Louis and Jean-Antoine Carrel, were placed ***hors de combat*** already at an

IN THE SUNLIT FOREST OF ORIZABA (10,000 feet elevation).

LE BOUTILLIER, PHOT.

elevation of 16,664 feet, although these travelers had thus far been subjected to but little muscular exercise, beyond being jolted to a legitimate extent on the backs of their burros. The symptoms, which lasted through a day and night, were feverishness, disturbance of the natural order of respiration, and headache, the last so intense as to render the party "almost frantic or crazy." The necessity of breathing with open mouths parched the throats, and "produced a craving for drink, which we were unable to satisfy—partly from the difficulty in obtaining it, and partly from difficulty in swallowing it. When we got enough, we could only sip, and not to save our lives could we have taken a quarter of a pint at a draught."

Subsequent ascents of Cotopaxi, Antisana, and Cayambe, and in a second assault upon Chimborazo, "nothing was noted that could be attributed to 'rarefaction of the air' except the feeling of lassitude and want of bodily strength which always manifested itself at the lower and lowest pressures." Dr. Güssfeldt, who, in February, 1883, attempted the ascent of Aconcagua, and reached an elevation of 21,025 feet (6,410 metres), experienced no inconvenience below 6,000 metres (19,680 feet); at that height respiration became difficult and was accompanied by pains in the muscles. The ill-feeling was attributed by Dr. Güssfeldt mainly to anxiety (for the welfare of the expedition brought about largely through verbal contests with his guides) and lack of sleep; with mental efforts and confidence, it is believed by Güssfeldt, the "puna" (the vernacular for "mountain sickness") can be successfully resisted. In his ascent of Kilima N'jaro (19,700 feet), in 1888, Dr. Meyer appears to have experienced no discomfort beyond difficult respiration and exhaustion, and it is significant that for sixteen days he had been working at an altitude varying between 15,000 and 20,000 feet.

I have already stated my own experiences on Orizaba; they were merely those of extreme exhaustion and difficult respiration, not accompanied by headache, nausea, or feverishness. To use the Schlagintweits's account of themselves during the memorable ascent of the Ibi Gamin, in 1855 (22,230 feet), I felt exceedingly tired and exhausted as I certainly never was in my life. The exhaustion was, however, purely momentary; a few seconds' rest was sufficient to restore me to what was seemingly a normal condition, and on the summit I relaxed my lungs to the extent of giving a wild whoop which fairly terrified my attendants, and brought out a powerful echo from the opposing wall of the crater. Boussingault, in the account of his ascent of Chimborazo, in 1831, also refers to the instantaneousness of his recoveries.

I made no attempt to ascertain to what extent my mental powers were impaired on the summit; I feel certain that there was no appreciable diminution of their normal qualities, nor was I for a moment incapacitated from doing the work which was set out for me. In other words, being bodily well, I had no reason to assume that I was mentally unwell. De Saussure, in the personal account of his memorable ascent of the Mont Blanc in 1786, asserts that he was unable to perform in four hours and a half—the length of his stay on the summit—the experiments which he habitually performed in three hours or less at the level of the sea, and concluded from his results that such experiments could never be made at that elevation (15,784 feet). The accomplishments of Whymper, Güssfeldt and Conway, more particularly, who successfully worked their instruments at elevations of upwards of 20,000, 21,000 and 22,000 feet respectively, do not sustain De Saussure's prophecy.

From whatever cause the discomforts of high-mountain travel arise, it is beyond doubt that they can be largely eliminated through habituation. The experiences of Whymper, without citing other cases pointing in the same direction, clearly prove this. In my own experience, I found the ascent of Popocatepetl, which was made within one week's time of the ascent of Orizaba, much less fatiguing than that of the last-named; again, the ascent of Ixtaccihuatl, apart from physiographic considerations, was, for equal altitudes, much more readily accomplished than that of Popocatepetl. Our attack on Orizaba was made within one week's time after we had landed at Vera Cruz, and, therefore, before we had time to habituate ourselves to even fairly elevated regions. But the space of a single week between our efforts on Orizaba and Popocatepetl was sufficient to give to us a wonderful advantage. Mr. Baker, one of my associates, who, after very considerable exertion, gave up the effort on Orizaba at an elevation of some 17,700 feet, made the ascent of Popocatepetl without difficulty, and was again with me on Ixtaccihuatl. It must not be supposed, however, that there are not sometimes relapses in habituation.

Güssfeldt, who, in his first attempt on Aconcagua, reached the very respectable elevation of nearly 20,000 feet without experiencing any serious inconvenience, was less fortunate in a second attempt in the month following (March 4–5), on which occasion the mountain trouble asserted itself already at an elevation of 18,400 feet.

As regards the cause of mountain-sickness, I think there can be little doubt that the explanation given by Whymper is approximately the correct one. It is that such effects as acceleration of the circulation of the blood, increase in the temperature of the body, and pressure on the blood-vessels are (probably) "due to the expansion (under diminution of *external* pressure) of gaseous matter within the body, which seeks to be liberated, and causes an ***internal*** pressure that strongly affects the blood-vessels. While equilibrium was being restored between the internal and external pressure, the 'indescribable feeling of illness' gradually disappeared, and headache died away; and it may be reasonably expected that these 'acute' troubles can be escaped by taking pains to avoid abrupt diminution of pressure." The sudden dizziness and headaches, the hemorrhages, "mortal pangs" and "drunken sensation," which are the experiences of high-ascensionists, whether on land or in balloon, or of those who subject themselves to artificial diminution of atmospheric pressure, are referred to this cause; the "degree of intensity of the effects, and their earlier or later appearance, depend upon the ***extent*** of the diminution in pressure, the rate at which it is reduced, and the length of time it is experienced."

THE PEAK OF ORIZABA FROM THE DIVIDE (13,000 FEET).

As regards the amount and quality of ***mal de montagne*** which one experiences in high altitudes, it is certain that they are largely determined, aside from constitutional peculiarities, by the amount of exertion, physical and mental, to which the receptor has subjected himself. This fact probably accounts for the circumstance that the troubles which the "ancient masters" in mountain-climbing experienced at comparatively insignificant elevations are barely felt to-day in the same localities. The paths and methods of ascent have been made much easier and have correspondingly removed the hardships and excitements of earlier days. Mr. Graham well remarks: "Unquestionably, man's range is increasing. Read any old account of an ascent of Mont Blanc; it was expected that the climber should suffer every possible inconvenience from rarefied air, and the harrowing details were duly forthcoming. Now the ascent is mere child's play, and we hear no more of those agonizing horrors."

One of the earliest accounts of mountain-sickness that we possess is that given by Father Joseph de Acosta, in Book III. of his "Natural and Moral History of the Indies," published nearly three centuries ago (1590). It is so pictorial that no apology is needed for reproducing it here. "I thought good to speak this, to shew a strange effect, which happens in some parts of the Indies, where the ayre and the wind that rains makes men dazie, not less, but more than at sea. Some hold it for a fable, others say that it is an addition; for my parte I will speak what I have tried. There is in Peru a high mountaine which they call Pariacaca, and having heard speake of the alteration it bred, I went as well prepared as I could . . . but notwithstanding all my provision, when I came to mount the stairs, as they call them, which is the top of this mountaine, I was suddenly surprised with so mortall and strange a pang that I was ready to fall from my beast to the ground; and although we were many in company, yet every one made haste (with out any tarrying for his companion), to free himself speedily from this ill passage. Being then alone with one Indian, whom I entreated to keep me on my beast, I was surprised with such pangs of straining and casting, as I thought to cast up my soul too, for having cast up meate, fleugme, and choler, both yellow and greene, in the end I cast off blood, with the straining of my stomacke. To conclude, if this had continued, I should undoubtedly have died; but this lasted not above three or four hours, that we were come into a more convenient and naturall temperature."

LANDSCAPE PAINTING AND THE LAWS AND FORMS OF NATURE.

IT is the province of the landscape painter to improve upon nature. This is an oft-repeated proposition, one that has been fathered by a large body of artists and received by the still greater body of the credulous public. What is intended by "improving upon nature" is never clearly stated, nor would it be easy to define a statement which is the embodiment of a purely subjective feeling, analyzed and interpreted in many different ways by as many different minds. Assuming the human figure to be the departure for idealization, it is easy to conceive that a combination of characters might be found and introduced into the graphic representation of a single form which, on the whole, would determine a figure differing from any actually ever created, and one that might, perhaps, be properly considered to be an improvement on any. There would be few to criticise such a combination of characters, since it merely brings together, without doing real violence to nature, what might readily have been united initially. This conception of the making of the ideal in figure painting is generally made the text for a "similar" departure on the part of the landscapist, who sees in a combination of vegetable forms his conception of an ideal tree or shrub, in the commingling of rocks his notion of geological structure, and in the adjustment of surface-contours that rehabilitation of relief which makes the supposed mountain. The inquiry naturally suggests itself, to what extent are such departures permissible, and how far are they the result of ignorance on the part of the artist, or of carelessness in his work?

It may be taken for granted that there are not many among the lay community who would sanction the combination of an oak and pine in the same vegetable unit, any more than they would sanction the combination of a horse and narwhal into an animal species for any but a heraldic function. Yet it is an indisputable fact that in many paintings prominence is given to vegetable forms which in their general construction of parts—the trunk, branches and foliage—would defy for their determination the eye of the keenest botanist not less than the all-knowing native instinct of the rugged field-boy. Similarly, mountain contours are delineated which could be naught but a joy to the relic of the cataclysmic school of geologists. What purpose do these aberrations serve, and why are they, in most cases, allowed to pass by unnoticed or uncriticised? The latter question can be answered by the frank admission that the positive knowledge of the picture-admiring public regarding form in nature is so limited that it does not permit of the expression of a critical opinion. What is given is received, and it is merely the question of how it pleases—especially in the color-play—which determines favorable reception and possible purchase. The standard of criticism which is applied to figure painting is lost in the general ignorance which marks the knowledge of physiographic relations—an ignorance which is in many, or perhaps most, cases shared as much by the artist as by the public with whom he deals.

A few years ago a distinguished English scientist, after making a critical survey of one of the annual exhibitions of the Royal Academy of London, published a scathing review of some of the more "important" landscape work of that year, and pointed out some remarkable bits of no-knowledge on the part of the artists. That rocks should be painted with that "breadth of feeling" which would permit them to be identified in the two extremes of down-heaps and slices of plum-pudding was scarcely a matter for surprise; nor need the inverted reflection of an image in a pool of water be considered in any other light than that of a studio mistake. Charity does well not to dwell too emphatically upon blemishes of this kind. But what is to be said in extenuation of rainbows being drawn in perspective, with a foreshortened arch? And of others in which the natural order of colors was reversed?

Startling though such revelations concerning a "royal" exhibition were, it is but proper to add that the calumnies were immediately met by some of the injured members of the artist fraternity and by their friends; they filed their caveat that scientists had no business to meddle with art, that a scientific painting was not art, and that artists would continue to paint as they chose, and make nature, if nature as now existing did not satisfy the demands of their brush and palette. The rapid development of impressionism, or what purports to be impressionism, during recent years proves that the artist's threat has been carried into effect. It may be doubted if any unhealthier spirit ever crept into art than that which seeks to justify the tenets of the would-be impressionists as regards the color-key. It is, however, no longer from the artistic standpoint that the new school seeks its support; the justification is claimed to be from the side of science, or from nature as she actually is. The credulous public is informed that the true perception of a region is an instantaneous or fleeting one, dim as the shadows of a floating cloud; that the most violent contrasts of color are the breath of a sun-glow, disappearing almost immediately after the first impression has been carried from the eye to the brain; and that a quivering everything pervades all the objects by which we are surrounded. These fleeting somethings appear to be the starting points of what is now commonly designated the "yellow and purple school," whose works the less-charitably inclined have wished to be as fleeting as the principles upon which they are based. While something, doubtless, can be said in favor of any departure from any long-recognized method of painting, and while it cannot be denied that some exquisite effects have been produced by the more moderate impressionists, despite impressionism, yet it can be safely asserted that the claims of the new school find no justification from the side of science. There appears to be no good reason for applying the instantaneous "impression" principle, either as regards form or color, to mountains, valleys or trees, any more than there is to animals. There are few artists who would to-day essay to paint a running horse with eight, nine, or ten legs, merely because the eye sees in such a moving object a confused assemblage of parts. The ocular misrepresentation is corrected in the mental picture, and it is this which ought to be made permanent. Quivering atmospheres and flesh may be an artistic realization of certain effects in nature—and subjectively they may even be realities to some persons—but they have no true belonging in the domain of science. For this reason, however, there need be no absolute condemnation of all that the impressionist has produced or is producing; it is the underlying principle of his work that should be guarded against. There should be but one school of landscape painting—the school of nature. A true interpretation of nature's secrets, obtained through a close and catholic study of the different parts, combined with artistic feeling, cannot but create the breath of life as it is revealed in true mountain contours, in rock-like rocks, and in the foliage that covers the earth from the Arctic to the Antarctic zones.

A PROPOSED ANTARCTIC EXPEDITION.*

DR. F. A. COOK.

THE North Pole and the regions surrounding it have long and often been brought before the notice of the public. Although the geographical pole has not been reached, many of the scientific questions involved in these frozen northern regions are now known. The north-polar region has been visited so often by navigators, adventurers, and recently by scientific explorers, that the geography of its surroundings is fairly well charted, and I feel confident that ere the lapse of five years the North Pole will be reached, and a fair idea of the topography of its immediate surroundings will be at the command of geographers. While this state of chronic excitement, with intermittent epidemic enthusiasm, has been constantly directed northward, the south-polar regions have been neglected, and very little is known of the antarctics. It seems natural that this should be the case when we consider the respective relative positions of the two points with regard to the more densely inhabited portions of the earth. The one is situated almost in the centre of the land hemisphere; the other occupies a corresponding position in the water hemisphere, surrounded by a waste of wild seas, and lying thousands of miles away from any inhabited land. So utterly isolated are the South Pole and the regions surrounding it, so lonely and cold is it in its solitude, that one would hardly feel astonished if it had failed to attract the curiosity of mankind.

It was to satisfy curiosity that the first expedition to the southern frigid zone was undertaken. Old geographers entertained the quaint idea that in the southern seas great continents existed, as a necessary condition of terrestrial construction, in order to counterbalance those in the north, and maintain the earth in stable equilibrium. From time to time search for these imaginary lands was made. Previous to the beginning of this century, many attempts had been made to enter the ice-barrier and discover the continent supposed to exist, but their only success had been the discovery of a few barren islands. As a result of this the old geographers were disgusted that nature should have neglected to have constructed an Antarctic continent, and scratched from off their maps the great mainland of the southern seas, which had figured so long on their charts.

Early in this century a few important discoveries were made, and about 1835 the American and several European governments began to take an interest in these regions. As a result of this international interest, which was perhaps international pride intermingled with curiosity, the United States Government elaborately fitted out an expedition under the command of Lieut. Wilkes, and the French an expedition under the command of Admiral Dumont d'Urville.

Shortly after these had been fitted out, the English fitted out an expedition on a grand scale, under Capt. James Ross. The meagre results of these expeditions, and the intensely bitter controversy they excited, I presume are familiar to all. Since the date of Ross's expedition, which continued the search longest, and was most successful, little additional information with regard to the Antarctic zone has been gained. In 1874, however, the *Challenger*, commanded by Capt. Nares of the Royal Navy, during her voyage around the world on a scientific expedition, cruised in southern seas, and even entered the Antarctic circle, making many interesting observations. It is not known that any human beings have ever wintered inside of the Antarctic circle; but two or three landings have been effected, and these only for a few moments; so that our present knowledge of the south-polar conditions can be summed up in a very few lines. The temperature here is much lower than that of the Arctic regions. The ice barrier that bars its domains far eclipses anything of the kind in the northern frigid zone. The gigantic mountains, covered with never-melting snow and ice, transcend in height anything of the kind discovered by northern explorers. These things we know about the antarctics. Of other features of the region, one may form conjectures, but we cannot be sure until some one has carried on a series of scientific observations below the Antarctic circle. It is my purpose to perform this task.

At once the questions arise: "How am I going to do it? To what part of the Antarctic regions shall I go? What arrangements shall I make for transportation to the far south? What preparation to meet the adverse conditions of cold, of grinding ice, of lack of food, that will meet me? What branches of science will be benefited by my investigations?"

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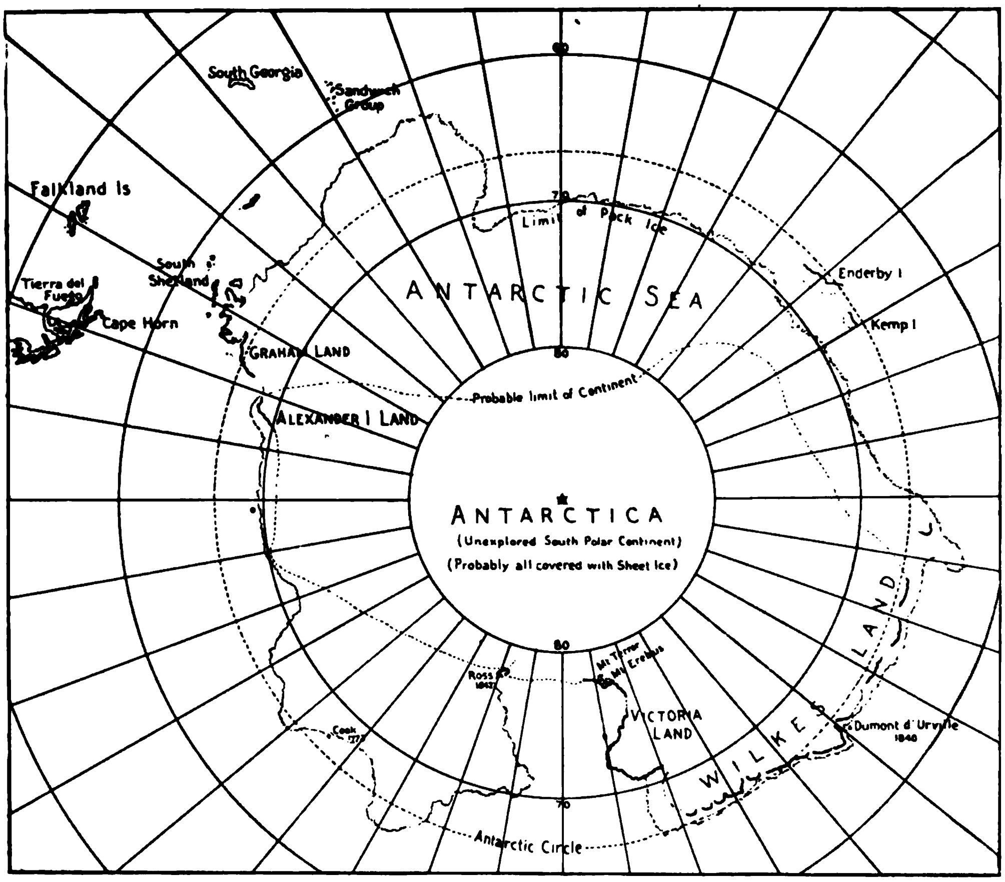
* Memorial presented to the American Geographical Society.

I shall go to the far south in a steam whaler.

The right or Greenland whale is rapidly becoming extinct. Whale oil has become less desirable since the introduction of other oils to take its place, and whaling, in general, has become very unprofitable within recent years. This has thrown several excellent vessels built for Arctic service, especially fitted for work in ice-bound seas, on the market, where they can be bought at low figures. I purpose to buy one of these steam whaling vessels of about 300 tons and refit her for Antarctic service. She must be provisioned for three years. While two strongly-built steamers of this kind would be perhaps more desirable, their use would so increase the expense as to render the enterprise almost impracticable. I think that one vessel can be so equipped as to render retreat safe and certain if the vessel is lost. On the decks of the steamer we shall carry two life-boats. One of these shall be large enough to cross the rough waters between the South Shetland Islands and South America; the other, a smaller one, built for ice navigation.

Since the seasons are reversed in the southern hemisphere, the months for exploration will be December, January, February and March. Therefore, the expedition should leave New York about September 1st. The course will be New York to the Falkland Islands; there replenish our coal and provision supply. From the Falkland Islands we shall steam directly for Terra Louis Philippe; on one of the islands off this coast we shall deposit one of our life-boats, with provisions enough to reach the Falkland Islands from there. From Terra Louis Philippe our course will depend much upon the movements of those vast packs of ice drifting around the Polar area at the mercy of the prevailing winds and currents, leaving temporary openings in the direc-



Map from Bartholomew's Atlas. The assumed continental limit is very problematical.

tion of the continent or the Pole. We shall here take advantage of the first practical opening to enter the ice barrier, and proceed in a southerly direction to the most southern point at which we may be able to reach land. There we shall search for some nook or harbor for our vessel, establish our headquarters, and begin systematic scientific observations at once.

What remains in store for us to face on this frozen continent during the long, gloomy Antarctic night, one can do little more than conjecture. We shall be so fortified against the elements, that if the storms are worse and the temperature lower than in the northern regions, it will not materially affect our existence. We shall be thoroughly prepared to meet the worst. After our observatories are placed and our winter quarters complete, the time before the departure of the sun will be spent about as follows:

The immediate surroundings will first receive a detailed geological and topographical survey. Meteorological observations, which will begin on our arrival, will be continued right along unremittingly for one year.

A party will be kept constantly in the field in search of animal and vegetable life in the sea and on the land. This party will also search diligently for fossil remains of earlier life.

The inland ice, if it exists, will be examined with a view to utilizing it as a highway for more southern explorations. If we find it practicable for this purpose, we shall establish an advance station of provisions as far to the south as possible. From this advance station we shall begin operations the following spring, when the sun returns, for an extended southern sledge journey across the continent. As the sun disappears, explorations in the field must cease, and a systematic routine of mental and physical exercise begin. The length of this Antarctic night will, of course, depend upon the latitude that we will be able to reach. After my experience in the Arctic regions, this phenomenon presents no terror to me. I feel confident that if a proper system of exercise be enforced, and by the aid of modern foods, we need not fear the curse of earlier explorers—scurvy. We shall have an abundance of work during this long, gloomy night, both indoor and outdoor. Our dogs will require some attention, and with the aid of them, short sledge journeys will be made on moonlight nights. The preparations for the long sledge journey will be left to occupy the minds of the members of the party during this time. Sledges will be built, skin and snow-shoes made and perfected. Fur clothing and sleeping bags will be tried and altered in the changed conditions. Our whole traveling equipment will be tried and perfected during the long night; our clothing will be made almost entirely of furs and bird-skins that I brought with me from Greenland last summer. The garments will be cut on the Eskimo pattern, and will consist of fur outside garments and bird-skin undergarments. I have little faith in knit clothing for these regions, and consider it almost worthless in extremely low temperatures. We shall have an extensive library, from which monthly magazines, weeklies and daily papers will be served at regular intervals. As soon as the sun returns, our actions in the field will again begin. The inland party for more southern explorations will then start on their journey across the inland sea; the scientific observations will be continued along the coast, and as much of the coast explored on sledges and in boats as the time before our retreat will permit. After the return of the inland party, which will be about the 1st of March, we will at once begin our retreat. We shall use every endeavor to protect our vessel from ice pressure, and try to keep her from being jammed or detained in the ice-packs. If we should be so unfortunate as to lose our vessel, our retreat is so planned that by the use of a combination of small boats and sledges, which can be drawn over ice, we will be able to reach our life-boat on an island off Louis Philippe Land, and in this cross over to the Falkland Islands.

After we have crossed the Antarctic circle, if the time and weather conditions will permit, we shall endeavor to study the mainland and islands in the region of Terra Louis Philippe. Leaving here, we shall probably reach the Falkland Islands about May 1st; from there, after stopping at one or two South American ports, we shall steam direct for New York.

I do not believe that anything is to be gained by a large party on polar expeditions. My party will not number more than twelve or fourteen, including the ship's crew. My scientific corps will not be more than four or five, and the other members of the party shall be intelligent, educated volunteers. The long and pleasant voyage from New York to the Falkland Islands will give me an excellent opportunity to drill every member of my party for the work which they are to undertake in the south polar regions. Much of the detail equipment will be left to occupy the minds of the members of the expedition until the long winter night. I believe that by allowing each man to work out and perfect his own equipment, their minds will be best and most effectively employed. This being done, the greatest obstacle, the nervous depression during the period of constant darkness, will be happily overcome.

Our food will consist of a vast variety of canned and dried foods, meats, vegetables and fruits, enough for three years. Coal and coal-oil will be our fuel, with an additional supply of seal oil to fall back on. Our outside garments will be made of Arctic reindeer, Eskimo-dog and wolf skins. This, I believe, after having tried almost every other variety of clothing, to be the best way to fortify the body against extremes of temperature. On our journey southward, in the region of the Antarctic circle, we shall be enabled to obtain large quantities of birds and seal. Both the bird-skins and the seal skins we shall utilize for additional clothing. The meat will be dried or frozen for later use, and the fat will be stored for fuel.

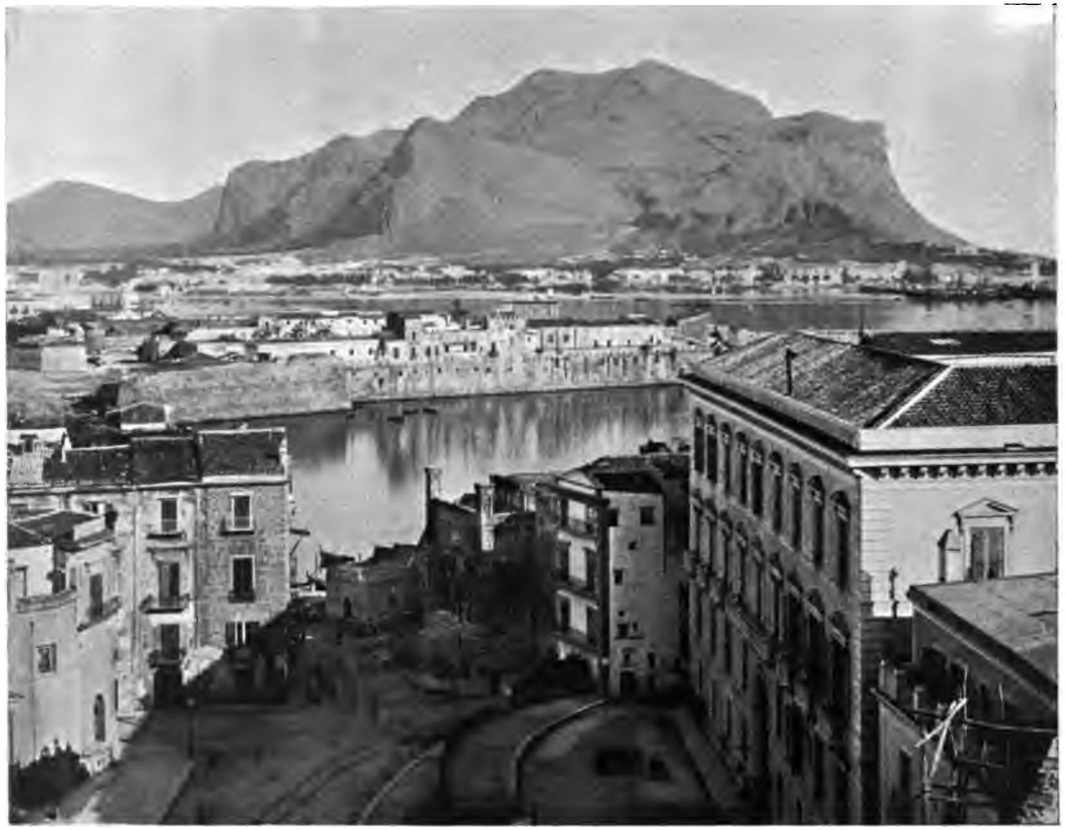
I have now fifteen Eskimo dogs from northern Greenland; from these I expect to breed a team of fifty dogs to take with me. This being an experiment, and a new departure, I am not prepared to say whether I shall be able to do so, but I think by clipping their fur in summer, and modifying their diet, that I shall be able to save a fairly good team. Pemmican will be our food and alcohol our fuel. On prolonged sledge journeys, it will not be practicable to carry a tent; as soon as our day's journey is at an end, we will get in our Arctic-reindeer sleeping-bags and turn in the snow to sleep. I do not expect to prolong the southern sledge journey more than three months; on this journey the glacial phenomena, snow and ice formation, etc., will be carefully studied. Many other important meteorological and geological observations can be taken. A very novel investigation, and one to which I expect to devote a great deal of attention, is the Antarctic ice-cap, which, perhaps, is nearly 2000 miles in diameter, and probably nearly circular in form; its thickness is a problematical matter, and has been a subject of much theorizing by scientific men, who argue that if a thickness of 15,000 feet could be assigned to it, it would present a mass of ice large enough to displace the earth's centre of gravity nearly a mile to the southward of its centre.

It will not be possible during the time that we shall remain there to do extensive detailed surveying in prospecting along an ice-bound coast. It is my intention thoroughly to study a local rather than the general region. The branches of science that will be most benefited by our observations will be meteorology, geography, geology and zology. A series of climatic observations of measurement of temperature, atmospheric moisture, wind force and air currents; of data as to snow and rainfall and cloud formation, would be material of great importance to meteorologists. These will be especially valuable if an inland ice exists on the Antarctic continent, and these observations can be taken there, since on these huge tracts of ice and snow the atmospheric conditions must be entirely different from those of any region from which we now have regular systematic observations. It is from the Polar regions that many, perhaps most, of the storms spring that are so destructive on land and sea. Before we can understand these difficult weather problems, we must first have a topography of the land masses surrounding the poles of the earth, particularly the South Pole. A thorough knowledge of the conditions there exisiting is more important from a meteorological standpoint than a knowledge of the tropics.

To carry these plans into effect on the most economical basis, I shall require not less than $50,000, more than half of which will be expended on the vessel. This money I expect to raise by private subscriptions and through the aid of scientific societies. Much of it has already been promised, and some of it I expect to derive from a course of lectures.

IN SUNSHINY SICILY.—PALERMO.

WITH the Italian peninsula standing for so much that is beautiful and majestic in art and nature, and for so much that is interesting in an almost unbroken line of development of a great people, it is hardly to be wondered at that a neighboring island, more Italian in some respects than Italy herself, should have so long remained neglected by the vacation traveler. It is only within recent years that Sicily has begun to attract attention on



PALERMO AND THE MONTE PELLEGRINO.

the part of the wanderer to the Mediterranean shores, and before long, doubtless, that fragment of a land-mass which yet so clearly marks a not very ancient connection between the European and African continents will have justified its claims to recognition. With one of the mightiest and most active volcanoes rising from its surface, and far across the line of perpetual snow, with Sicilian orange gardens and native figs, umbrageous chestnuts and willowy olives, there is enough in this land of summer and winter sunshine to attract and to repay—for the casual wayside wanderer, the artist, and the student of natural phenomena alike. It is possible that a largely unsettled condition of the inhabitants, the existence on a disagreeably active scale of native brigandage, may have been responsible for staying the tide of Italian travel at Salerno and Brindisi—the outposts of a fairly safe civilization. To-day, however, while a relic of that upper class of brigands who style themselves the "order of gentlemen" still exists, and at times with painful reminders, it can be said that the craft of the road-robber is soon to be a memory of the past. The energetic administration of the late Governor, General Pallavicini, has virtually set the seal of despair upon these ancient heroes, and in a few short years, with a continuance of the policy of the past, the final vestiges of danger will have completely faded out of sight.

Although placed in a comparatively high latitude, occupying approximately the position of the region included between Norfolk, in Virginia, and the city of Washington, Sicily enjoys an essentially sub-tropical climate; tempered by the warm breezes of the southern continent, and under the genial influence of a surrounding sea, it has been brought to a degree of equableness perhaps only second to that of Madeira Without any very elevated mountain chain to disseminate the cold of condensation, there is an almost total absence of those chilly draughts which sweep across the plains of Piedmont and Lombardy and even annually descend into the valley of the Arno. A perpetual half-summer smiles throughout the entire year, with comparatively few excesses in the direction of either heat or cold. Sicily lies just beyond the natural boundary of the date, although it is well within the area of its cultivation.

To the physiographer, a special interest attaches to the island through the fact that it represents a part of the connection which formerly united Europe with Africa, and divided the Mediterranean into two largely unequal basins. It would appear that up to almost the latest geological period, at the time when the large ice-sheet covered much of Northern Europe, such a connection still existed, and across it, doubtless, was effected much of that animal migration which has so largely equalized the faunal elements of the northern and southern shores of the Mediterranean. The successive disruptions in the floor of the Mediterranean basin—subsidences in a region of crustal weakness associated with volcanic manifestation—brought about the existing separation — a physiographic parallel to which is to be found in the position of Cuba and the former land-locking of the Gulf basin by way of Florida and Yucatan.

Sharing largely the construction of the Italian peninsula, of which it is truly only a dismembered part—with the foaming whirlpools and eddies of the Straits of Messina to remind one of the ancient Scylla and Charybdis—Sicily presents generally the scenic features of the southern mainland, and through its length and breadth, not less than along the entire coast, the wanderer will everywhere find charming bits of nature. In Messina, one of the best harbors of the world, he has the busiest in all Italy, and with it, that active scene of life, under a southern color, which is so eagerly sought after by the wielders of the brush and palette; the activity of Genoa has been translated to the farther south. Of the many beautiful scenes, however, probably none surpass that of the harbor of Palermo, the judicial and ecclesiastical capital of the island. The great mass of the Monte Pellegrino, rising in rugged severity from the bay, with its undulating valley and down-coursing zig zag line of aqueduct, constitutes a picture which can well be compared with that of the Bay of Naples, if, indeed, it does not surpass it. To many eyes, it constitutes the most picturesque contour to any harbor in the world. From its summit, which is readily reached, the eye sweeps over a landscape of almost unsurpassed loveliness—the distant Etna, the blue bay, the stately mansions of the city, with their domes and campaniles, and the charming gardens buried beneath their wealth of sub-tropical foliage. Of these the Flora is considered one of the most beautiful in all Italy.

Palermo, the ancient Panormus, with happy appropriateness designated "*la Felice*," numbers to-day nearly a quarter of a million of inhabitants, and ranks as the fifth city of the Italian kingdom. Many of its buildings date from a far back period, and some of them are of rare and striking beauty. The Church of San Domenico is one of the most capacious in all Europe, and it is claimed that it can accommodate 12,000 people.

JOHN TYNDALL.

IN the death of this distinguished physicist, which took place on December 4th last, the scientific world loses one of its most brilliant expounders. Few names of persons not officially connected with the politics of a country have been more prominently before the public during the period of the last quarter of a century than that of Professor Tyndall. With all the resources of the scholar, the caution of the critical and successful experimentalist, and a force of oratory which always stood him in good stead, Professor Tyndall was generally in the fore front of any discussion or controversy which touched the modern development of science. With his intimate friend, and for many years associate in scientific work, Professor Huxley, and the late Charles Darwin, he formed the trio of savants whose names have long been identified with nearly all that was eminent in English science and with that conscientious, but at the same time broad, method of investigation and of forcing a conclusion which has exerted so remarkable an influence upon the tendencies of research in general and upon questions of sociology in special.

Professor Tyndall was a fearless combatant, and he rarely had occasion to feel the wounds inflicted by an adversary. As the successor of Michael Faraday in the chair of Natural Philosophy at the Royal Institution of Great Britain, he continued the researches of his illustrious master, and added additional luster to the institution with which the names of Humphrey Davy and David Brewster had already been associated,and where at present Lord Rayleigh, scarcely less eminent than any of his predecessors, is the presiding genius. Tyndall's researches in the domains of magnetism and of molecular physics generally have won for him world-wide recognition as a successful experimentalist ; as a teacher and expounder of his researches he had no superior and but few equals.

Fond of nature's works as they were revealed in his laboratory, Professor Tyndall was still more fond of the grand scenes that presented themselves without. From the earlier days of his scientific career—when,with Huxley, he first investigated the laws of glacial physics—almost to the end he was a devoted friend of the Alps, and few mountaineers in that region of rugged ice-fields could claim superiority over the British scientist, either as a daring venturer over the new and unbroken fields or as a successful transgressor of paths that had already been beaten. Tyndall was the first to make the dangerous passage of the Mont Cervin (Matterhorn) from Breuil to Zermatt, and he was likewise the first (in 1861) to scale the hitherto inaccessible peak of the Weisshorn. For many years of late he was a regular visitor to the Bel Alp, where, amidst some of the grandest scenes of nature, he conducted experiments upon the impurities of the atmosphere and further investigations in the domain of glacial dynamics. No more charming work of out-door recreation or travel has appeared in the English language than Tyndall's "Hours of Exercise in the Alps"—a work which shows the savant in the light of a master of style and of forcible description, at the same time that it reveals that boundless enthusiasm for nature which, doubtless, helped much toward the success of his career. A second work, also largely embodying his studies in the Alps, is the "Forms of Water," forming the first volume of the International Scientific Series, which, with the exception of Darwin's Origin of Species, has seemingly been translated into more foreign tongues than any other scientific publication in the English language.

REALITY VERSUS ROMANCE.

REALITY VERSUS ROMANCE IN SOUTH Central Africa. By James Johnston, M. D. New York : Fleming H. Revell Company.

It is at times pleasant to turn from the narrative of the more erudite traveler, whose function may be considered to be the discovery of some new land-mass, of some hitherto unknown production, or the tracing of a lingual affinity, to the simple tale of the home-like wanderer, who starts out without any special mission of discovery and with the sole intent of seeing properly and of hearing truthfully. There is, as a rule, less exciting material in this latter form of narrative than in that of the explorer—few of those dramatic incidents of a journey are recorded which so readily help to frame the "boy-traveler." Adventures with cannibals and savage beasts are replaced by pleasant palavers and commonplace hunting incidents, just as impassable and miasmatic swamps and jungles give way to genial savannas and cheering forest. So often is this found to be the case that one is tempted to inquire how the difference of experience arises.

Prof. Drummond in his work on "Tropical Africa" ventures, indeed, to draw the veil from the picture that has generally been drawn of that continent, and assumes to disenchant the reader of preconceived notions regarding vast and impenetrable primeval forests, of gayly plumaged birds, of monkeys swinging from trapezes in shaded bowers, etc. For this the self-styled "minor traveler possessing but few assets" is severely taken to task by Stanley, who asserts that the "description by Professor Drummond bears no more resemblance to tropical Africa than the tors of Devon, or the moors of Yorkshire, or the downs of Dover represent the smiling scenes of England, of leafy Warwickshire, the gardens of Kent, and the glorious vales of the isle." Nyassaland, the region traversed by the talented divine whom Stanley describes as "qualified to write F. R. S. E., F. G. S., after his name," is represented to be not Africa, but itself.

The average reader finds it difficult to choose between two such diametrically opposed statements, but it can probably be safely admitted that his choice, so far as the simple narrative is concerned, very generally lies with the side of the "adventurous tale." Harrowing adventures with belly-beating gorillas are more attractive than alliances with domesticated baboons which have been trained to do flagging-service on railway lines—the quelling of native disturbances far more fascinating than the distribution of awards for good behavior. Perhaps, then, the color to a narrative is frequently given more as a matter of choice than as an expression of stern reality.

Like Drummond, Johnston belongs to the class of travelers who largely failed to meet with adventure. Indeed, he has the courage to assert that in a twenty months' traverse of South Central Africa, during which he "traveled four thousand five hundred miles, mostly on foot, and alone so far as a white companion is concerned, passing through numerous hostile and savage tribes, traversing areas hitherto reported too pestilential for exploration, surmounting natural objects which have been represented as insurmountable, and penetrating regions where no white man had ever gone before," he never once found himself prompted to fire a shot in anger, or was he compelled to do so in self-defense against a human enemy. Of the many native carriers who traveled with him, he "did not lose one by death." Surely it would appear that the days of Livingstone are still in the present! And is it for nothing that Mrs. French-Sheldon so savagely criticises the "murderer" Dr. Peters, and that the latter, in turn, so roundly abuses his aggressor?

Mr. Johnston, whose mission in Africa appears mainly to have been to ascertain how far the services of the Christian natives of the West Indies, more particularly of Jamaica, could be requisitioned as aids in mission work on the continent, gives a pleasant recital of his in no way very remarkable wanderings. The picture of African travel that he presents is one varying largely from that of most of his predecessors, and carries with it a flavor of truthfulness which is clearly more marked than is to be found in the narratives of many of his predecessors. With the author of "How I Crossed Africa" he has little patience, and the work itself is relegated to the class of the "dime novel" and "penny dreadful" series of African adventure tales. To quote Mr. Johnston's words: "I don't believe there is a country under heaven that has been the subject of more romancing and misrepresentation than Africa." Mr. Johnston's *vade mecum* was his camera, and it is certain that he made excellent use of it. The illustrations to the work, camera reproductions, are of an exceptionally high order and mark a decided departure from the commonplace and almost worthless designs or caricatures which disfigure most (especially English) works on African travel and exploration. Alike for scenery and people they give a most vivid impression of reality, and will serve to correct many of the erroneous notions that have been gathered from the "standard" works of exploration. Especially to be noted are the illustrations of the two main falls of the Zambesi River, which depict with a refreshing vigor the beauties and grandeur of a portion of the African landscape.

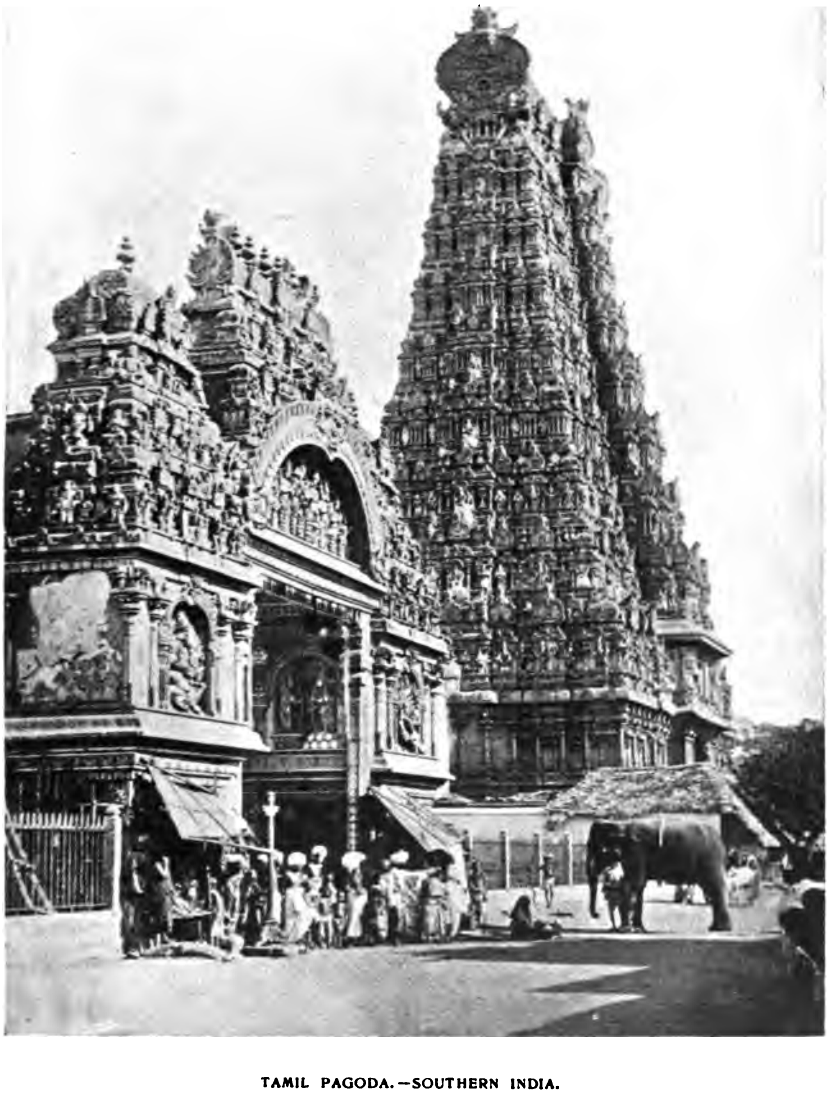
NOTES.

Little doubt longer remains as to the fate of Björling and his associates, who, in June, 1892, in an entirely unworthy craft, the "Ripple," left St. John's, N. F., for the exploration of Melville Bay and Smith Sound, and from whom for a full year no news of any kind had been received. Captain McKay, of the Dundee whaler "Aurora," who in June last visited the Carey Islands, which lie in the open North Water, near the entrance to Smith Sound, reports finding there various documents and the partial remains of the ill fated expedition. It appears that the vessel of the expedition had to be abandoned at that point, and that the members of the expedition, or such as survived, then attempted to cross over to Ellesmere Land, on the American side, with the hope of reaching an Eskimo settlement there. One or more bodies were found in a cairn erected at the site of the wrecking of the vessel, and hope may yet be entertained that some members of the party successfully accomplished the traverse of the separating water. Unfortunately, the expedition, although under the command of an experienced but seemingly reckless leader, was wretchedly equipped in everything pertaining to an Arctic venture, and especially in the matter of food-supply was there an utter disregard of contingent occurrences. The documents found by Captain McKay, the latest of which bears the date of October 12, 1892, were addressed to Baron Nordenskjöld, with whom it was understood that Björling would be associated in the (contemplated) Antarctic Expedition of this year.

An exceedingly venturesome journey, sustaining the capabilities of a woman for a very special kind of "roughing," has recently been brought to completion by Mr. and Mrs. St. George Littledale. The journey involved the traverse of the heart of Tibet and the passage down the greater length of the Hoang Ho, with an exit at Peking, at the close of September, 1893. Many geographical observations were made along the route of travel, perhaps the most important of which is the demonstration that the Ritter Range of mountains of some cartographers does not exist. Four wild camels were shot on the northern side of the Altyn Tag. The Hoang-Ho, which was descended in a raft, was left at the big southerly bend, and the rest of the journey accomplished in carts. Mr. Littledale thus describes his entry into Peking: "We arrived here a couple of days ago safe, for if the Chinese carts had nearly thumped us to death, the inns, on the other hand, had made us very much alive."

A recent survey of the Carpathian Mountains shows that in the region of the Tátra alone—the knot of mountains containing the highest summits of the Hungaro-Galician frontier—there are not less than one hundred and twenty lakes, all of which are situated at elevations exceeding 3900 feet, and some as high as 7200 feet. As is also the case with most of the lakes of the Pyrenees and of the Eastern Alps, the lakes of the Tátra are all found in the granite districts, and are entirely wanting in the limestone tracts. Their distribution is largely coincident with the zone of greatest glaciation in the Carpathians, bespeaking for them a probable glacial origin. The lakes occurring below 5000 feet are of a morainic character.

The *Geographical Journal* of London (December, 1893), contains an abstract of a note by Mr. Ernest Favenc on the future habitability of the Australian desert. He does not regard the "desert as hopelessly unproductive territory, though he admits that it is only by the continuance of the artesian water-supply across the continent that it can be reclaimed. The characteristic growth of the desert land is the prickly grass known as spinifex, which, on the flats, plains, and downs, is softer and not so uncompromisingly hostile as on the stony ridges. It is not because the soil is poor, but simply on account of the rainlessness of the climate that the spinifex is so universal; it is the only possible form of vegetation in a country where one rainless year follows another. Where there is any moisture at all a good growth of grass at once takes place. . . . The introduction of the date palm has already been fairly successful. The western interior must not be regarded as permanently given over to spinifex and desolation. The soil is there, and with the introduction of water would at once teem with vegetation. There is no reason why the Australian desert should not be turned into a garden, like many places in the Sahara and in America, provided only the essential water-supply is obtainable from deep wells." Recent researches of travelers make it clear that the "uncompromisingly" inhospitable character of desert regions generally has been exaggerated.



TAMIL PAGODA.—SOUTHERN INDIA.

Around the World.

VOL. I. MARCH, 1894. No. IV.

A DESCENT INTO THE CRATER OF VESUVIUS.

THE INTERIOR OF A VOLCANIC CRATER.

THE traveler who a few years ago sauntered out over the dusty Observatory road in the direction of the Vesuvian cone, and reached his *ultima thule* after wading for the better part of two hours, perhaps, through 1,300 feet (vertical) of the most impalpable ash, found at the summit a moderately large depression or pit, more or less circular in form, from which volumes of steam and vapor, quietly at times, at other times with an ugly paroxysmic fervor, were issuing and gracefully clouding the crest in a wreath of white and yellow. When blown somewhat to one side masses of dark rock, painted with sulphurous and arsenical incrustations of yellow and red, were revealed to the eye, which at intervals, also, penetrated to the bottom of the pit or crater and fell upon a mass of seething and fiery fluid, red white or white-red, which spoke in angry moanings or detonations beneath its canopy of vapor. The lava appeared and disappeared in turns, rising occasionally quite to the surface of the conduit in which it was contained and gently flowing over, but more commonly dropping back out of sight into the deeper parts of the same channel, through which it was attempting to effect an escape. Every disappearance was accompanied by a special liberation or explosion of vapor, whose booming re-echoed the volcanic thunder from the walls of the crater.

At longer intervals showers of molten lava, rapidly solidifying into clinkers, were thrown thirty or forty feet into the air, falling with a disagreeable splatter on the sides of the diminutive cone, situated nearly centrally in the floor of the main crater, which was the seat of the disturbance. The construction of parts was then as follows: A large pit or basin—the crater proper—a few hundred feet across in its greatest dimension, and with a plunging depth of a little more than a hundred feet, occupied the summit of the mountain; nearly centrally in its floor was a small mound or cone, only a few feet in height, which held the seething lava, and from which were issuing the curling clouds which shrouded the inner landscape. A scientist who visited the volcano at that time thus records his impressions:

The view into this workshop of mother earth was bewilderingly imposing. For once it seemed as though access had been given to the key of the universe—as though a special invitation had been extended to man to view the real workings of nature. As we stood on the crest of the mountain, bathed in the warm sunshine of an early April day, even with the premonition of impending disaster, a longing desire came over us to approach nearer to the actual scene of action. We tumbled down the irregular and loose wall of the crater, and soon found a firm footing on the rough and blistered floor, which had solidified out of a previous lava flow. It had, in fact, only partially solidified, for through holes and spaces in the upper crust, which became more and more numerous as we approached the little cone, the fiery, and, as yet, semi-fluid magma disclosed itself in disagreeable proximity to the surface. Only a few inches beneath us the red-hot lava was still burning with life and with a vigor in its temperature which was alike unpleasant for walking or for standing; yet so firmly had an upper layer knitted itself together that we felt absolutely secure even on our thin cake—an exceedingly narrow margin between heaven and earth. With the wind on our backs we cautiously approached the working monticule, crouching beneath the noxious vapors which were being belched forth in an almost unremitting stream. We had come to the cone itself, and the rising lava was almost at arm's length from us. Every explosive liberation of steam was accompanied by a thunder-like detonation, and then followed the dull rumbling of the lava column falling to its deeper parts; this process alternated with the heaving up bodily of the lava, scattering its blown-out spray and particles as a shower of (future) cinders. They fell away from us, and did not disturb a feeling of special security which we enjoyed, despite the warnings of an uncomfortably hot atmosphere.

With most people, seemingly, the erroneous notion prevails that the approach to an active crater is an undertaking which is at all times hazardous, and one which requires special caution in its execution. The recital of travelers' experiences in volcanic summits is received with special interest, and astonishment is commonly expressed that a part of anybody has been left to tell the tale. Yet it is well known to the practical traveler that, with the exercise of only ordinary caution and the judicious selection of the opportunity, most craters can be approached, even to the near boundaries of their special foci of activity, without fear or trembling, and generally without special discomfort.

It is not difficult to find a reason for the common belief. The conception of a "burning mountain," of the bowels of the earth being thrown out at its surface, is in itself awe-inspiring, and calculated to develop a superstitious dread which is wholly different from anything that attaches to other phenomena of nature. Add to this the knowledge that the only truly cataclysmic force of which we have cognizance is resident within the volcanic domain, and that many of the direst catastrophes which have visited the earth's surface were, in one way or another, associated with volcanic phenomena, and it is all but impossible to escape the feeling which has become so generally prevalent. Even the person knowing fully the conditions that are to confront him in such a visitation cannot at times eliminate from himself the feeling that he is attempting something special, just as the Alpinist, in traversing the elevated snows and ice-fields, feels that he is trespassing upon ground which has to an extent become sanctified through untold and unnecessary disaster.

The picture of the Vesuvian crater a few years ago is no longer the picture of to-day. Through successive volcanic discharges from the diminutive central cone, with its own craterlet, the main crater has become filled in and obliterated, and a new top given to the volcano. On it is reared the present active cone, building higher and higher as it quietly continues to smoke away. A new eruption may blow out the top of the mountain, or it may be followed, through the removal from below of solid material, by the subsidence of a portion of this top; either way, it is likely that a crateral depression would be formed, with a series of events following as before. This is the consecutive history of most volcanic craters, and the picture of the Vesuvian crater stands as the picture of the equivalent structure in nearly all other volcanoes.

Great variety exists in the size and configuration of craters, although, as has just been remarked, their general structure is much the same. Some are profound, and others shallow; some, again, are only a few hundred feet, or less, in extent, while others measure as much as two or three miles in their greatest diameter. The summit crater of Mauna Loa, in the Sandwich Islands, measured immediately after the eruption of 1886 about 19,000 feet in greatest length, with a depth of about 800 feet, or nearly 400 feet less than it was a half-century before. Scarcely inferior in size to Mauna Loa is the crater of the parasitic Kilauea, which measures about 14,000 feet in greatest extent. Enormous as these craters are, they fade into insignificance when compared with the crater of Aso-San, a volcano of the island of Kyūshū, Japan, which is reputed to have a diameter of from ten to fourteen miles.

No relation is found to exist between the height of a volcano and the size of its crater. Some of the lowest volcanoes are known to have the largest craters, and, conversely, many of the loftiest volcanic mountains have craters of only indifferent size. Whymper describes the crater of Cotopaxi, the loftiest of all known active (continental) volcanoes, with the possible exception of Demavend, on the southern border of the Caspian Sea, to be an irregular oval, with longer and shorter diameters of 2,000 and 1,500 feet, and a depth of about 1,200 feet.

"The general angle from the edge of the rim to the bottom exceeds forty-five degrees. The mean of a great number of observations would perhaps be about forty-eight degrees. At no part is there a continuous slope from top to bottom. The amphitheatre is made up of a large number of cliffs (often vertical and even overhanging) and of slopes of all degrees. . . . The upper part was noticeably fissured, but from about half way down, down to the bottom, cracks and fissures were numerous; and from these apertures vapours of

EXPLOSION FROM THE VESUVIAN CRATER. INSTANTANEOUS VIEW.

various tints were lazily issuing — some white, grayish, or dark, but none were inky black." The lowest part of the crater was occupied by a circular, glowing, fiery spot, estimated to be about 180 feet across, over the surface of which "flames were flickering and traveling about in all directions," presenting an appearance similar to that seen "when a flat dish is half covered with lighted spirits."

Almost the exact counterpart of the structure which Whymper describes is found also in the crater of Popocatepetl, the largest of the lofty craters of the North American continent, although the "flames of fire" have seemingly been extinguished for some time.* The terraced structure is well shown in the plate illustrating the crater of the great Mexican volcano which accompanies this article.

It is certain that the dimensions of many craters have been increased beyond the limits of their first formation by means other than those which were employed in their making. In some cases, seemingly, the additional extent has been given by a "blowing" off of the top of the volcano—a sudden paroxysm of energy decapitating the summit of the mountain. In other cases a subsidence or settling of the top, following upon long-continued action, appears to have brought about the equivalent result. It is known that a partial subsidence of the crateral walls of Vesuvius followed the eruption of 1886; at the same time it is positively asserted that the violent eruption of Bandai-San, in Japan, in July, 1888, blew out a very large part, perhaps one-half, of that mountain.

The ultimate transformations of inactive craters are various; some remain for a long time intact, others crumble to an almost shapeless mass of ruins. In many cases they become the depositories of accumulating water, and give charm to the landscape from a source which would not readily be suspected by most persons. The beautiful lakes of South and Central Italy, like those of the volcanic region of France, are most of them implanted in the hollows of craters—the seat at one time of the disrupting force of fire, to-day the mirror for a quiet and peaceful nature. The twin lakes which occupy a portion of the ragged crater of the Nevado de Toluca, in Mexico, at an elevation of 14,000 feet, are among the loftiest lakes that are known to the geographer; the Lago Lucrino, in the Neapolitan region, which served the Emperor Augustus as a sheltering harbor for his fleet, lies at the level of the sea and communicates with it.

ALONG WINTER ROUTES OF TRAVEL.—JAMAICA AND THE BLUE HILLS.

A RECENT writer on Jamaica, the Hon. C. J. Ward, C. M. G., presents the following introduction to the land which seems destined some day, through the charm of its scenery and the equability of its climate, to become one of the most popular of winter resorts with the winter traveler:

"The traveler, within one or two weeks of snow and damp, and warm overcoats and fur-lined gloves, can lounge on deck and feast his eyes on a succession of scenes as picturesque and as dazzling in their beauty and varied charms as are to be seen anywhere in or out of the tropics. There are the rock-bound shore, the level beach, plains running down to the sea, gloomy lagoons and thick jungles of vegetable growth, broken here and there by river courses or dry ravines, while in the background are to be seen mountains and hills, differing in height from the modest hillock by the beach to the stately Blue Mountain Peak in the distant centre of the island, the whole covered either with careful cultivation or with the reckless luxuriance ot tropical life."

This glowing description of a land which until a few years ago, owing to repeated visitations of yellow-fever, was considered to be a pest spot on the globe, will probably be received with hesitation by those who have imbibed the notion that all tropical regions are more or less unhealthy and should be avoided with a systematic caution akin to a forbidding rule. There is no doubt, however, in the case of Jamaica, that the popular belief regarding its natural unhealthiness is only a belief and not a fact. Carefully prepared statistics show,

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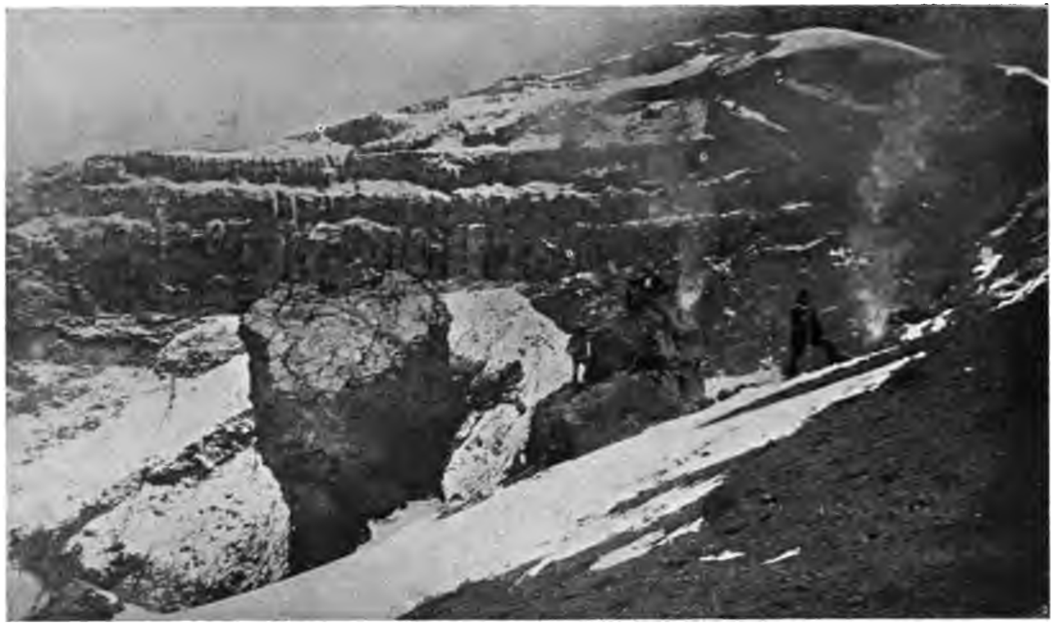
* Unless vague reports of recent activity be well founded.



THE "SMOKY MOUNTAIN" SMOKING.—IN THE CRATER OF POPOCATEPETL.

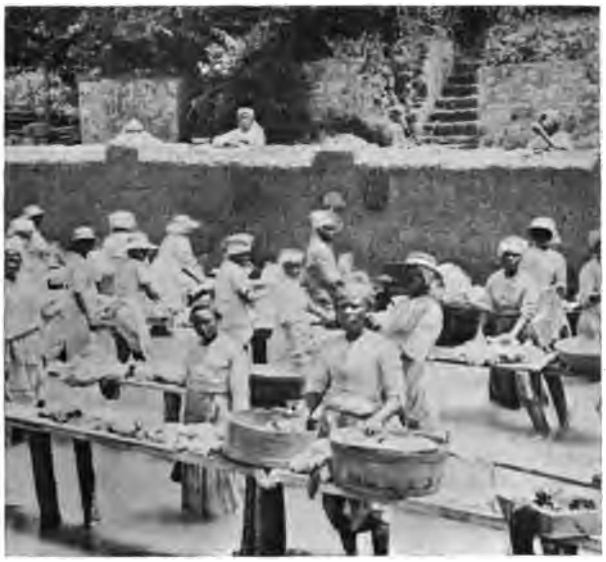
(17,000 FEET.)

that when proper sanitary precautions are taken and due care is paid to personal hygiene, the climate of the island becomes an enjoyably secure one, and, indeed, it may be said to rank for the greater part of the year as very nearly the equal of any of the world. If we are to believe the statement of the present governor, Sir Henry Blake, an acute and conscientious observer, the army medical report places Jamaica as "almost the healthiest station for the British troops out of the United Kingdom."

Comparatively few regions of the earth's surface enjoy a more equable climate than any given part of Jamaica, whether it be on the seashore or on the elevated mountain summits. At Kingston, the capital, the extreme range of temperature for the entire year is only 35° F. The maximum temperature at the level of the sea rarely rises much above 90°—once only in the interval of 1880–86 did the thermometer mark 96°—while the minimum seldom falls below 60°. On the mountain slopes, at elevations of from 4,000 to 5,000 feet, the thermometer in a general way ranges between 50° and 70°, occasionally dropping to the freezing point on the still higher elevations. During the cold wave of February, 1886, which spread general destruction through the orange plantations of Florida, solid ice was formed on the summit of Blue Mountain Peak, at an elevation of 7,300 feet.

In no other region, perhaps, can the full beauties of the tropics, in their varied aspects of valley and mountain, of deep gorges and tumbling waterfalls, of cultivated vales and sombre virgin forest, be as pleasurably enjoyed as in Jamaica. Good and easy roads have made distant points readily accessible, and at many places a few hours' excursion will carry the traveler from the heart of the tropics, with all the wealth and luxuriance of vegetable growth of which the tropics are capable, from cocoa-nut palms and bananas, orchids and tree-ferns, coffee plantations and cinchona groves, across the haunts of the wild-hog, the parrot, ring-tail and solitaire, to an upper region having absolutely temperate characteristics. Banks of strawberries along the wayside here and there mark a natural transition between the two regions.

Approaching the island from the sea the most prominent object is the Sugar Loaf, but the culminating point of the Blue Hills is Blue Mountain Peak, on the summit of which, at an elevation of nearly a mile and a half above the sea, a rude hut has been constructed for the convenience of the mountaineer. Much of the mountain



IN FRONT OF THE SEA-WALL.—JAMAICA.

slopes are still covered with virgin and almost impenetrable forest, the product of a soil of almost unsurpassed fertility. Over it a more than generous supply of rain is annually distributed ; at Castleton the average annual rainfall is about 110 inches.

Jamaica numbers to-day approximately 650,000 inhabitants, an increase of 150,000 in the last quarter of a century. They are in the main a law-abiding people, and seemingly as much (or more) security is guaranteed the traveler in the island as in the southern United States. Kingston, the chief city and capital, reputed to be the healthiest seaport town of all the British West Indies, is a fairly modern city of some 50,000 inhabitants, with advanced institutions of learning, but without much, either architecturally or otherwise, to attract the stranger. Nineteen miles from it are the famous Castleton Gardens—a rich botanical field for the visitor from the north, where the eye feasts upon a luxuriant display of many of the most interesting and attractive products of the south, upon plantations of palms, cacao, rubber, nutmeg, clove, mango, vanilla and coffee. Here, too, are to be found the ***Victoria Regia***, the ***Amherstia nobilis***, one of the most magnificent of ornamental flowering trees, the Upas tree of Java, and the traveler's tree of Madagascar (Ravenalia)—all of them growing with a natural vigor.

Port Royal, the earlier chief city, which was at one time described as "the finest town in the West Indies" and "the richest spot in the universe," but of whose former greatness few evidences remain, is still in part under the dominion of the sea, the result of the earthquake of June 17, 1692, and the submerged ruins are still plainly visible in favorable weather through the clear water. Of the dreadful catastrophe of 1692 an early account gives a vivid, even if not absolutely accurate, picture :

"Whole streets with their inhabitants were swallowed up by the opening of the earth, which when shut upon them squeezed the people to death, and in that manner several were left with their heads above ground, and others covered with dust and earth by the people who remained in the place. It was a sad sight to see the harbor covered with dead bodies of people of all conditions, floating up and down without burial, for the burial place was destroyed by the earthquake, which dashed to pieces tombs, and the sea washed the carcasses of those who had been buried out of their graves." The tomb is still shown of Lewis Galdy, "who was swallowed up by the earthquake and by the Providence of God was, by another shock, thrown into the sea and miraculously saved by swimming until a boat took him up."

SIR SAMUEL BAKER AND THE EXPLORATION OF THE UPPER NILE.

THE death of Sir Samuel White Baker, which took place on the 30th of December last, removes from the geographical world one of its most distinguished members, and from the cause of humanity a noble expounder. As the leader, in a practical way, of the movement which had for its object the reformation or regeneration of East-Central Africa in the suppression of the slave trade, Baker broke the path for the labors of his no less distinguished successors, General Gordon and the late Emin Pasha, and initiated the work which, with varying success, has been carried on almost unremittingly for a period of a quarter of a century. Even if everything has not been accomplished that had been hoped for, the effort to subdue the African wilderness and annex it to the civilized world has done much which cannot readily be undone, and has paved the way to the finish, which, in the nature of things, cannot be far removed. The present energetic movement at colonization is largely, if not almost entirely, the outgrowth of the labors of the three men whom the world has at times been pleased to call "fanatics"—Baker, Gordon, and Emin.

Baker's claims to recognition as a discoverer rest mainly on his African explorations. Early in the "sixties," when the question of the sources of the Nile still largely agitated geographical societies, both at home and abroad, he organized at his own expense the expedition which successfully terminated in the discovery of the second "great basin" of the Upper Nile. the Albert Nyanza. Nearly six years before, Speke had already determined the existence of the Victoria Lake, and in 1862, in conjunction with Grant, had demonstrated that this great equatorial sea was one of the fountain-heads of the "king of African waters," but it was reserved for Baker, working on information that had been given to him by Speke, to make known the dual source of that stream. If the later researches of Gessi, Mason and Stanley have shown that the Albert Nyanza, as a main feeder of the Nile, has not the importance that was attached to it by Baker, the character of Baker's exploration is not thereby diminished, even if it must be admitted that the misdetermination of size is not clearly explicable, nor the fact that the region supposed to be covered by the Albert Lake is one of very varying altitudes.

With our present knowledge, which is not likely to be disturbed to any extent by future explorations, the Victoria Lake or Ukereve, with its main feeder, the Kagera or Alexandra Nile, is the virtual "great basin" of the Nile; the Albert Lake, and the more southern Lake Albert Edward, which communicates with it through the Semliki River and receives its waters largely from the Ruvenzori Mountain, are secondary to this basin.

Baker was an ardent sportsman and an accurate observer of the habits of the animals with which he came in contact; his work on "Wild Beasts and their Ways," published in 1890, corrects many erroneous statements that had crept into general works on natural history, largely as the result of exaggeration on the part of travelers. Besides his two main works, "The Albert Nyanza, Great Basin of the Nile" and "Ismaïlia, a Narrative of the Expedition to Central Africa for the Suppression of the Slave Trade," Baker published much that was of general and special interest, and perhaps few books have given greater pleasure to boys than his "Tales for My Grandsons." He was a Fellow and Medallist of several of the more important geographical societies of the world, and a Pasha and Major-General in the service of the Sultan of Egypt. Throughout his first exploration in Africa—his three years' wanderings in the region of the Upper Nile—he was accompanied by his wife, a Hungarian lady, whose remarkable pluck and devotion, great composure and resource under tried and exacting conditions, are made apparent from the pages of her husband's narrative. It is acknowledged that the expedition owed much to her presence —a denial to the commonly received notion that women can only be an encumbrance on expeditions of this kind.

UNSOLVED PROBLEMS IN THE CONSTRUCTION OF THE EARTH.—THE OCEANIC TROUGHS.

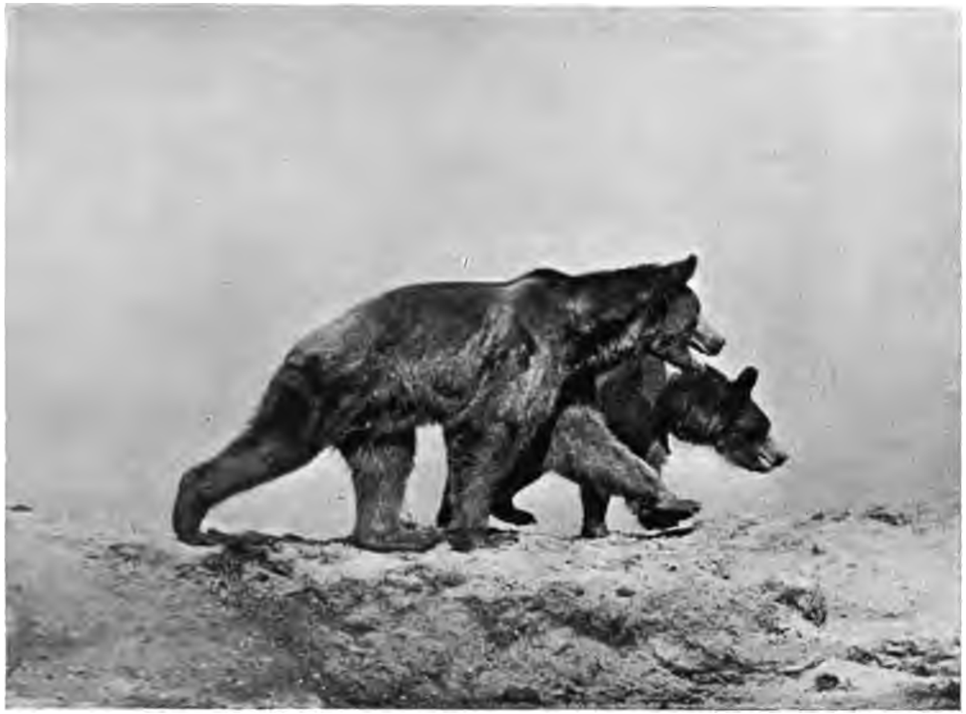
THE EDITOR.

OF the many unsolved problems connected with the physics of the earth's crust, there is none, perhaps, concerning which a broader diversity of opinion can legitimately exist than that pertaining to the origin and development of those great depressions which constitute the oceanic troughs. How were they formed? How were they maintained? What is their present condition?—these are questions which the geologist has not yet been able to satisfactorily answer, and it may be in the dim future before a positive answer to them will be made possible. While many facts known to the geologist argue for certain possibilities, perhaps even probabilities, in connection with these questions, none are of such a nature as to carry with them the weight of even approximate demonstration. So far as the origination of the oceanic troughs is concerned, the weight of opinion holds that they represent very ancient flexures or breakages in a yielding crust incident to a general contraction of the planetary mass. No facts that we know of to-day positively contravene this position, and there are but few which give more than theoretical support to it. It is, however, positively known that extensive flexures in the upper portion (or "crust") of the earth's mass have at various times taken place, and while none are known that equal in magnitude the undulation which marks out the continental elevations and the oceanic depressions, it is by no means impossible that such an extensive fold (or series of folds) did at a time of crustal irrigidity actually take place, and that it brought about a more or less permanent and definite disposition of land and water areas. Again, it is practically certain that large sections of the land-surface—and with little doubt, also, of the land beneath the sea—have at different times "broken through," as it were, in the direction of the centre of the earth. Evidences of such fallen or "faulted" blocks, as they are known to the geologist, are sufficiently numerous. To these breakages are due in great part the particular landscape features of many countries, the differentiation of mountain and valley, etc., and to them, likewise, many geologists ascribe the formation of some of the large interior water basins, such as the Mediterranean, the Baltic Sea, and the Gulf of Mexico.

To the average mind the trough of the sea presents itself as a very different structure from what it in reality is. Its great depth presupposes a rapid plunge or descent, and, therefore, an abrupt and distinct demarkation from the continental boundaries, and even the scientific eye has been frequently led astray in its conception of the structure. Far from being sharply cut away from the continental lines, the actual contact is such a gradual one that the continents may be properly described as burying themselves as shallow plains beneath the oceanic surface—plains which frequently have but 300–400 feet of water above them at a distance of fifty or sixty miles from the coast. Were the oceanic water to be drained off this coastal region, the eye would rest upon a seemingly flat and horizontal expanse—an expanse over small areas of which no descent would be at all visible. Outward from this continental shallow of some 75–100 miles—or 200 miles, as it is on the west coast of Ireland—begins the so-called "rapid" plunge of the sea-bottom, but even this is so gradual that up much of its slope a horse and wagon could be driven without serious difficulty. With this conception of the nature of the oceanic bottom in our mind, it no longer becomes necessary to invoke the aid of some "wholly unknown" agency as a factor in the formation of the structure in question. Whether gentle foldings or breakages brought about the existing conformation or not, they were certainly able to do so.

But even if we admit this simple formation of the oceanic basins, we are not yet informed as to the time when the deformation took place which brought them into existence; nor do we know how much of the depth which the oceans now have is an accumulated one—*i. e.*, how much of it has been gradually added since the troughs first began to shape themselves. Twenty-five years ago, under the lead of the great Lyell, geologists held very generally to the opinion that serial interchanges between the land and water-areas of the globe had at different times taken place—that the continental parts, after having been more or less continents, had at recurring intervals been again submerged, or given over to the dominion of the sea, and, conversely, that the oceanic areas had just as often been turned into dry land. Just how these interchanges were supposed to have been effected was never clearly understood, but they were broadly associated with the known instability of the earth's crust, and from the evidences of marine deposits of successive ages covering the continental areas, there can be no doubt that the continental submergences did, in fact, take place. In the quarter of a century which has followed the brilliant teachings of Lyell, the opinion of geologists on at least one point of his contention of continental and oceanic interchanges has become largely modified. It is the dictum to-day that, however unstable may have been the continents, the oceanic troughs have, from their first demarkation, remained virtually permanent. With this word the dream of the Atlantis vanishes (?) from the scene.

The *a priori* evidence favoring this latter conclusion appears at first sight sufficiently strong. Granting that the oceanic depression represents a sinking in of the crust over an expanse of crustal weakness, there is no special reason for assuming that this condition of weakness has ever changed; and if it has not, then it lies within a probability, at least, that the depression once formed has continued to remain a depression, and with possibly steadily increasing measure. Again, it is well known that the oceanic basins are constantly receiving accessions of weight in the form of sediments that are thrown into them from the wear and tear of the continents, and in organic accumulations, and these accessions, if they do anything, must, in the nature of things, tend only to still further depression. As yet, however, we do not know from actual evidence that this extra accession of weight does act in this way. It is true that in some regions where the sedimental output of rivers is very great, a sinking of the oceanic floor does, in fact, take place; but it is not known that the sinking is due to this cause—indeed, the position of the river's mouth may, in itself, be determined by the sinking.



BEARS MARCHING.

(PHOTOGRAPHED FROM LIFE.)

The two conditions here stated are virtually all upon which the geologist of to-day bases his assumption of oceanic permanency. They may satisfy the problem or they may not. An additional argument is frequently drawn from the condition ot the continents, which are likewise assumed to represent permanent areas. Their numerous submergences, it is true, indicate movements of elevation and depression, but it is claimed that these alternate movements were of only moderate extent, and did not extend beyond the limits of *virtual* permanency. The evidence for this belief is founded on the character of the different marine deposits which cover the continental surfaces—or, preferably, perhaps, make the continental surfaces—and which over large areas show unmistakable traces of shallow-water conditions. He would, however, be a courageous geologist who would to-day assert that all of the vast deposits which cover the interior ot the North American continent, or traverse the extent of Eurasia, representing both the Paleozoic and Mesozoic periods, are ot this formation, or even that they are not more likely to be of a deep-sea origin! Despite the many ingenious arguments that have been brought forward to prove that chalk is not specially related to the white ooze which is now forming at the bottom of the sea, occasional unprejudiced minds will still be found who will prefer to believe that this relationship does exist, and that, indeed, it exists to a very surprising degree.

Manifestly, the kind of facts which makes evidence cannot readily be found in the investigation of the oceanic problem. In the nature of things the condition is such that presumption must almost entirely take the place of fact, but then a broad margin of error must be allowed for in any conclusion that may be reached from the uncertain premises. We may, perhaps, reasonably assume in the consideration of the problem before us that the oceanic basins have been *measurably* permanent from an ancient period, but there are no facts to prove or even to indicate that this permanency involves the present boundaries of the water-mass. On the contrary, it is far more probable that the existing dimensions have been brought about through progressive or cumulative subsidence, which has gradually swept away land-masses that at one time occupied some of the present area of the sea. The long lines of ridges which have been revealed to us by deep-sea soundings, and the placing on these of many of the oceanic islands (volcanic peaks), together with the evidence which the past and present distribution of life carries with it, all support this conclusion. It seems, indeed, impossible to account for the existence of oceanic (volcanic) islands, or for the negative islands which rise as prominences from the oceanic floor to within a comparatively short distance of the surface, except on the assumption of subsidence. Buttresses, like St. Helena, Ascension, the Caroline Islands, or the giant peaks of the Sandwich Islands, rising from depths of two or three miles, or more, have a special significance, and while it can be assumed that they have been built up to their prodigious heights from the bottom of the sea, it appears more probable, from what little we know regarding volcanic phenomena generally, that these peaks have been for a long time fully formed, and that they were formed at a time when their relations to the surrounding sea were more nearly those which govern the positions of by far the greater number of the active volcanoes of to-day. In other words, they were probably continental or sub-continental, and their present positions are the indices of continental subsidence. The discovery of a large number of submarine peaks, whose existence had not until recently even been surmised, rising to within a comparatively short distance of the oceanic surface, seems to support the general conclusion of subsidence.

As to whether the deep bed of the ocean, after it had once been formed, ever was upheaved in such a way as to make dry land, cannot, with the evidence that we have at present before us, be told. Sir Wyville Thomson, in summarizing the work of the *Challenger* Expedition, does, indeed, hazard the following bold statement—the anticipation of the views of possibly the majority of geologists to-day :

"There seems to be sufficient evidence that all changes of level since the close of the Paleozoic period are in direct relation to the present coast lines.

"There does not seem to be a shadow of reason for supposing that the gently undulating plains, extending for over a hundred million of square miles, at a depth of 2,500 fathoms beneath the surface of the sea, and presenting, like the land, their local areas of secular elevation and depression, and their centres of more active volcanic disturbance, were ever raised, at all events in mass, above the level of the sea; such an arrangement, indeed, is inconceivable."

Professor Huxley, in reviewing Professor Thomson's work, well says (*Nature*, November 4, 1880):

"I must plead ignorance of the 'sufficient evidence' to which Sir Wyville Thomson refers; in fact, I should have thought that the sufficient evidence lay in the other direction. . . . . That the abyssal plains were ever all elevated at once, is certainly so improbable that it may justly be termed inconceivable; but there is nothing, so far as I am aware, in the biological or geological evidence at present accessible, to render untenable the hypothesis that an area of the mid-Atlantic, or of the Pacific sea-bed, as big as Europe, should have been upheaved as high as Mont Blanc, and have subsided again any time since the Paleozoic epoch, if there were any grounds for entertaining it."

Professor Huxley's criticism holds as firmly to-day as it did thirteen years ago, when it was made. No facts that have since been made accessible have in any way diminished its force; on the contrary, the newer evidence tends largely to support it.

ILLUSTRATIONS OF ANIMAL LIFE.

THE BEAR.

IN our illustration of "Bears Marching"—a reproduction from one of the series of inimitable photographs taken from life by Ottomar Anschütz—one of the distinctive anatomical peculiarities of these animals is clearly brought to light. It is that in walking the bear plants the entire sole of the foot upon the ground, like man, some of the higher apes, etc., and unlike most of the larger quadrupeds that we find about us. The foot in the horse, for example, is represented not only by the small surface which comes in contact with the ground, but by all that stretch of bone which intervenes between it and the first elevated joint, or what is commonly recognized to be the "knee" (in reality, the wrist or ankle joint). The animal walks upon its toes, as do likewise the deer, goats, sheep, oxen, swine and cats; these animals are, in the language of naturalists, *digitigrade*—toe-walkers—as distinguished from the sole-walkers, or *plantigrades*, such as the bear, etc. In the giraffe, where there is a greater elongation of the foot than in any other land animal now living, the heel-bone is actually raised nearly three feet from the ground.

It is assumed by many naturalists that the first or normal method of walking among the mammalia was the plantigrade one, and that the succeeding elevation of the foot was gradually acquired as the result of a "straining after speed" on the part of the animal. It is well known that the majority of swift-footed animals are toe-walkers, and it is an every-day experience with the human species that the first initiative to very rapid walking or running is given by the raising of the heel of the foot from the ground. However correct or incorrect may be the theory which connects rapid animal locomotion with a gradually-acquired foot-elevation — and there are strong reasons for believing that it is well founded—it is certain that the bears, as sole-walkers, have managed to acquire a surprisingly rapid gait. The clumsy, ambling shuffle which marks the movements of these animals in the restricted cages of zoölogical gardens, or in the hardly less dismal confines of bear-pits, scarcely reveals those remarkable powers of locomotion which have been repeatedly pictured by travelers and hunters. That a bear should keep pace with a swiftly-running horse appears all but incredible; yet that this is the case is indisputably proved by a kind of testimony which cannot be doubted. Even the large grizzly is known to have given successful chase to a horse, and from the reports of Arctic travelers it would appear that the ice-bear of the North is no less swift. Our illustration, in depicting the length of the animal's stride, gives a true picture of speed, and will immediately dispel all preconceived notions of sluggishness "when sluggishness is not necessary."

The bears are in the main inhabitants of the temperate regions, although a descent into tropical countries is seen on the American continent, where one or more species have followed the long line of the Cordilleras to beyond the equator, and in Asia, where a few forms not only find a congenial home in the elevated subtropical forests of the Himalayas (Isabelline bear), but in the hot lowlands of the Malay Peninsula and Borneo. One species only is known from the African continent, inhabiting the Atlas Mountains. In the northern hemisphere the range of the animal extends probably further northward than that of any non-marine quadruped. Polar-bear tracks were found by members of the British Arctic expedition of 1875–76 beyond the 81st parallel of latitude. Indeed, the wanderings of this animal seem to be circumscribed only by the boundaries of solid ice; and even on floating cakes they not infrequently make protracted ocean voyages. The stranding of Greenland bears on the coast of Iceland is almost an annual occurrence, and in one year as many as twelve individuals are reported to have been translated in this way.

Of the ten or more recognized species the grizzly is probably the largest in bulk, although it has a close competitor in the Polar bear, and even in ferocity it is perhaps not the superior of the latter. Both of these species seem to make battle rather than wait for it, and their ferocity under certain conditions is such as to throw great hazard into the outcome of any encounter with them. Yet it is true, in the case of the Polar bear, that the Eskimo does not hesitate to enter single-handed, although with the support of howling dogs, into a bodily combat with it, relying for victory upon an unerring thrust of his spear. On the other hand, it is known that the grizzly has obtained its quarry by springing upon the horse of a flying horseman, just as in the jungles of India the tiger unhesitatingly springs upon the attacking elephant. Nearly the largest dimensions given to any bear are those which were claimed by Kane for a specimen of Polar bear brought down by him on his first Arctic expedition; its measurement of length is given at ten feet. A more accurate measurement of the specimen in question, however, shows the dimensions to have been considerably overstated, probably by fully a foot or more.

From the testimony of fossil remains of the ursine species that have been found in both the American and Eurasiatic continents—the greater antiquity of those occurring in the deposits of Eurasia—it would seem that the original home of these animals was the Old World, and possibly the region about the foot hills of the Himalaya Mountains. Indeed, their appearance on the American continent is geologically only a comparatively recent occurrence, dating perhaps from the latter part of the Tertiary period (Pliocene). If of Asiatic origin the migration into America was probably effected by way of the Aleutian Islands, whose continuity with the mainland has, indeed, only quite recently been made all but positive through the discovery among their deposits of mammoth remains. More facts are, however, needed before the question of origination can be definitely decided.

In the habitable part of the North American continent there is scarcely any large area of forest-covered country where bears are not to be met with, and their excursions generally extend to the immediate borders of civilization. Their range is from Canada and Maine to Florida, and westward to the Pacific coast. Probably only one species other than the grizzly, the common black bear, inhabits any part of this tract, but in Alaska, seemingly another and a very much larger form, the Alaska bear, makes its appearance.

TUNDRA AND FOREST IN SIBERIA, AND THE STRUGGLE FOR SUPREMACY BETWEEN SUMMER AND WINTER.*

HENRY SEEBOHM, F. R. G. S.

THE Arctic sea which lies at the bottom of the Polar basin is fringed with a belt of bare country, sometimes steep and rocky, descending in more or less abrupt cliffs and piles of precipices to the sea, but more often sloping gently down in mud-banks and sand-hills, representing the accumulated spoils of countless ages of annual floods, which tear up the banks of the rivers and deposit shoals of detritus at their mouths, compelling them to make deltas in their efforts to force a passage to the sea. In Norway this belt of bare country is called the Fjeld, in Russia it is known as the Tundra, and in America its technical name is the Barren Ground. In the language of science it is the country beyond the limit of forest growth.

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* Address delivered before the British Association for the Advancement of Science.

In exposed situations, especially in the higher latitudes, the tundra does really merit its American name of Barren Ground, being little else than gravel beds interspersed with bare patches of peat or clay, and with scarcely a rush or a sedge to break the monotony. In Siberia, at least, this is very exceptional. By far the greater part of the tundra, both east and west of the Ural Mountains, is a gently undulating plain, full of lakes, rivers, swamps and bogs. The lakes are diversified with patches of green water-plants, amongst which ducks and swans float and dive; the little rivers flow between banks of rush and sedge; the swamps are masses of tall rushes and sedges of various species, where phalaropes and ruffs breed, and the bogs are brilliant with the white fluffy seeds of the cotton grass. The groundwork of all this variegated scenery is more beautiful and varied still—lichens and moss of almost every conceivable color, from the cream-colored reindeer moss to the scarlet-cupped trumpet-moss, interspersed with a brilliant Alpine flora—gentians, anemones, saxifrages, and hundreds of plants, each a picture in itself, the tall aconites, both the blue and yellow species, the beautiful cloudberry, with its gay white blossom and amber fruit, the fragrant ***Ledum palustre*** and the delicate pink ***Andromeda pollifolia***. In the sheltered valleys and deep watercourses a few stunted birches, and sometimes large patches of willow scrub, survive the long, severe winter, and serve as cover for willow-grouse or ptarmigan. The Lapland bunting and red-throated pipit are everywhere to be seen, and certain favored places are the breeding-grounds of plovers and sandpipers of many species. So far from meriting the name of "barren ground," the tundra is for the most part a veritable paradise in summer. But it has one almost fatal drawback—it swarms with millions of mosquitoes.

The tundra melts away insensibly into the forest, but isolated trees are rare, and in Siberia there is an abundance of young wood on the confines of the tundra. The limit of forest growth appears to be retiring southward, if we may judge from the number of dead and dying stumps; but this may be a temporary or local variation, caused by exceptionally severe winters. The limit of forest growth does not coincide with the isotherms of mean annual temperature, nor with the mean temperature of January nearly so closely as it does with the mean temperature for July. It may be said to approximate very nearly to the July isotherm of 53° F. We may therefore assume that a six-foot blanket of snow prevents the winter frosts from killing the trees so long as they can be revivified by a couple of months of summer heat above 50° F.

The limit of forest growth is thus directly determined by geographical causes. In Alaska and in the Mackenzie basin it extends about 300 miles above the Arctic circle, but in Eastern Canada the depression of Hudson's Bay acts as a vast ice-house, and the forest line falls 500 miles below the Arctic circle, whilst on the east coast of Labrador the Arctic current from Baffin's Bay sends it down nearly as far again. On the other side of the Atlantic, the limit of forest-growth begins on the Norwegian coast on the Arctic circle, gradually rises until it reaches 200 miles farther north in Lapland, is depressed again by the ice-house of the White Sea, but has recovered its position in the valley of the Petchora, which is rather more than maintained until a second vast ice-house, the Sea of Okotsk, combined with Arctic currents, repeats the depression of Labrador in Chuski Land and Kamchatka.

There are no trees in Novaya-Zemlya. Two or three species of willow grow there, but they are dwarfs, seldom attaining a height of three inches. Novaya-Zemlya enjoys a comparatively mild winter, the mean temperature of January, thanks to the influence of the Gulf Stream, being 15° F. above zero in the south, and only 5° F. below zero in the north. The absence of trees is due to the cold summers, the mean temperature of July not reaching higher than 45° F. in the south, whilst in the north it only reaches 38° F. The Indians of Canada have discovered that when they want to find water in winter it is easiest reached under the thick snow, the thinnest ice on the river or lake being found under the thickest blanket of snow. On the same principle the tree roots defy the severe winters, protected by their snow-shields, but they must have a certain temperature (above 50° F.) to hold their own in summer.

The stealthy approach of winter on the confines of the Polar basin is in strong contrast to the catastrophe which accompanies the sudden onrush of summer. One by one the flowers fade, and go to seed if they have been fortunate enough to attract by their brilliancy a bee or other suitable pollen-bearing visitor. The birds gradually collect into flocks, and prepare to wing their way into southern climes. Strange to say, it is the young birds of each species that set the example. They are not many weeks old. They have no personal experience of migration, but nature has endowed them with an inherited impulse to leave the land of their birth before their parents. Probably they inherit the impulse to migrate without inheriting any knowledge of where their winter quarters are to be found, and by what route they are to be sought. They are sometimes, if not always, accompanied by one or two adults; it may be barren birds, or birds whose eggs or young have been destroyed, and who may therefore get over their autumn moult earlier than usual, or moult slowly as they travel southward. Of most species the adult males are the next to leave, to be followed perhaps a week later by the adult females. One by one the various migratory species disappear, until only the few resident birds are left and the Arctic forest and tundra resume the silence so conspicuous in winter. As the nights get longer the frosts bring down the leaves from the birch and the larch trees. Summer gently falls asleep, and winter as gently steals a march upon her, with no wind and no snow, until the frost silently lays its iron grip upon the river, which, after a few impotent struggles, yields to its fate.

The arrival of summer in the Arctic regions happens so late that the inexperienced traveler may be excused for sometimes doubting whether it really is going to come at all. When continuous night has become continuous day without any perceptible approach to spring an Alpine traveler naturally asks whether he has not reached the limit of perpetual snow. It is true that here and there a few bare patches are to be found on the steepest slopes, where most of the snow has been blown away by the wind, especially if these slopes face the south, where even an Arctic sun has more potency than it has elsewhere. It is also true that small flocks of little birds—at first snow-buntings and mealy redpoles, and later shore-larks and Lapland buntings—may be observed to flit from one of these bare places to another, looking for seeds or for some other kind of food, but after all evidently finding most of it in the droppings of the peasants' horses on the hard, snow-covered roads. The appearance of these little birds does not, however, give the same confidence in the eventual coming of summer to the Arctic naturalist as the arrival of the swallow or the cuckoo does to his brethren in sub-Arctic and sub-tropic climates.

The gradual rise in the level of the rivers inspires no more confidence in the final melting away of the snow and the disruption of the ice which supports it. In Siberia the rivers are so enormous that a rise of five or six feet is scarcely perceptible. The Yenisei is three miles wide at the Arctic circle, and as fast as it rises the open water at the margin freezes up again and is soon covered with the drifting snow. During the summer which I spent in the valley of the Yenisei we had six feet of snow on the ground until the first of June. To all intents and purposes it was midwinter, illuminated for the nonce with what amounted to continuous daylight. The light was a little duller at midnight, but not so much so as during the occasional snowstorms that swept through the forest and drifted up the broad river-bed. During the month of May there were a few signs of the possibility of some mitigation of the rigors of winter. Now and then there was a little rain, but it was always followed by frost. . . . . Between May 16th and 30th we had more definite evidence of our being within bird-flight of bare grass or open water. Migratory flocks of wild geese passed over our winter quarters, but if they were flying north one day, they were flying south the next, proving beyond all doubt that their migration was premature.

We afterward learned that during the last ten days of May a tremendous battle had been raging 600 miles as the crow flies to the southward of our position on the Arctic circle. Summer, in league with the sun, had been fighting winter and the north wind all along the line, and had been as hopelessly beaten everywhere as we were witnesses that it had been in our part of the river. At length, when the final victory of summer looked the most hopeless, a change was made in the command of the forces. Summer entered into an alliance with the south wind. The sun retired in dudgeon to his tent behind the clouds, mists obscured the landscape, a soft south wind played gently on the snow, which melted under its all-powerful influence like butter upon hot toast, the tide of battle was suddenly turned, the armies of winter soon vanished into thin water and beat a hasty retreat toward the Pole. The effect on the great river was magical. Its thick armor of ice cracked with a loud noise like the rattling of thunder, every twenty-four hours it was lifted up a fathom above its former level, broken up, first into ice-floes and then into pack-ice, and marched down stream at least a hundred miles. Even at this great speed it was more than a fortnight before the last straggling ice blocks passed our post of observation on the Arctic circle, but during that time the river had risen 70 feet above its winter level, although it was three miles wide, and we were in the middle of a blazing hot summer, picking flowers of a hundred different kinds, and feasting upon wild ducks' eggs of various species. Birds abounded to an incredible extent. Between May 29th and June 18th I identified sixty-four species which I had not seen before the breakup of the ice.

In the basin of the Yenisei the average thickness of the snow at the end of the winter is about five feet. The sudden transformation of this immense continent of snow, which lies as gently on the earth as an eiderdown quilt upon a bed, into an ocean of water rushing madly down to the sea, tearing everything up that comes into its way, is a gigantic display of power compared to which an earthquake sinks into insignificance. . . . .

At Yeniseisk the channel is about a mile wide ; 800 miles lower down (measuring the windings of the river), at the village of Kureika, it is about three miles wide, and, following the mighty stream for about another 800 miles down to the Brekoffsky Islands, it is nearly six miles wide. The depth of the channel varies from 50 to 100 feet above the winter level of the ice. This ice is about three feet thick, covered with six feet of snow, which becomes flooded shortly before the breakup and converted into about three feet of ice, white as marble, which lies above the winter blue ice. When the final crash comes, this field of thick ice is shattered like glass. The irresistible force of the flood behind tears it up at an average rate of four miles an hour, or about a hundred miles a day, and drives it down to the sea in the form of ice-floes and pack-ice. Occasionally a narrow part of the channel or a sharp bend of the river causes a temporary check ; but the pressure from behind is irresistible : the pack-ice is piled into heaps, and the ice-floes are doubled up into little mountains, which rapidly freeze together into icebergs, which float off the banks as the water rises. . . . . Some of the icebergs which we saw going down the main stream were of great size, and, as nearly as we could estimate, stood from twenty to thirty feet above the surface of the water. These immense blocks appeared to be moving at the rate of from ten to twenty miles an hour. The grinding together of the sharp edges of the innumerable masses of ice as they were driven down stream by the irresistible pressure from behind produced a shrill, rustling sound that could be heard a mile from the river.

A PROJECTED RAILROAD ACROSS THE SAHARA.

EDWIN SWIFT BALCH.

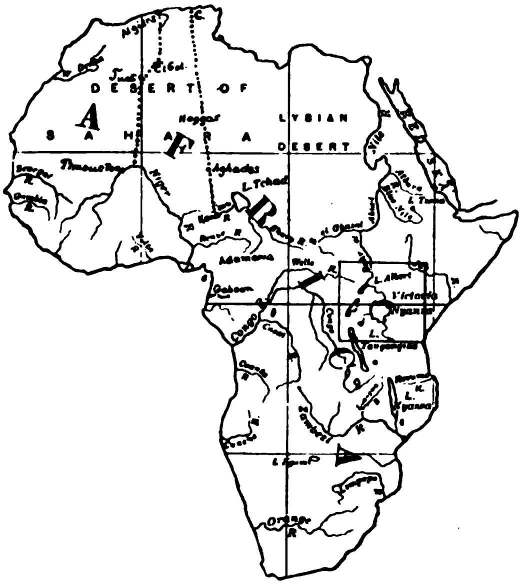
THIRTY years ago, the Hungarian traveler, Vámbéry, after a venturesome journey, in disguise and amid intense hardships, gave to the world the first accurate account of the Central Asian cities of Khiva, Bokhara and Samarcand. To-day the tourist no longer turns to Vámbéry to learn how to reach Turkestan, but to Bradshaw, and there he finds that a train leaves Azun-Ada on the Caspian in the evening, and, with a long stop at Merv and another at Bokhara, on the third evening lands him at Samarcand.

What the past thirty years have seen in opening up Central Asia, the next thirty we may confidently expect will see in bringing Northwest Africa into the field of the tourist. For before then, we may not only expect a line of steamers on the upper Niger, but direct railroad communication between Algeria and Senegal, via the Sahara and Timbuctoo.

This is no utopian dream. The French now have posts on the upper Niger at Bamaku and Sego and the trade routes to these stations from Senegal are being improved all the time, and the French are steadily keeping in view the plan of connecting their North and West African colonies. This in the nature of things will be accomplished by a railroad from Algiers to the great bend of the Niger.

The commercial value of such a railroad to the French would be very great, as it would open to them the entire commerce of the western Soudan—a land as valuable as is India. All tropical plants grow there with ease. Cotton, coffee, sugar, indigo, cacao, India rubber, etc., are the products of the country, and they develop with cultivation into important industries; moreover, the Soudan would become an outlet for many French manufactures.

According to General Faidherbe, formerly Governor of Senegal, Moulay Ahmed, one of the emperors of Morocco, sent in the sixteenth century an army mounted on camels from Morocco, via Tafilelt and Adrar, to the Niger, and conquered the Soudan. Chief Engineer Duponchel also reports that traces of a Roman occupation are to be found in the Hoggar mountain range and further south in the Ahir or Asben country. Rough bas-reliefs have been found there representing columns marching with the wagons drawn by bisons, and Barth figures many of the Roman remains found by him. Moulay Ahmed's expedition and the Roman remains are cited by the engineers in proof of the possibility of large bodies of men crossing the Sahara, and they argue that what could be done with only camels or bisons as a means of locomotion could be far more easily accomplished with a railroad.



.... PROJECTED SAHARAN RAILROADS.

The question of the possibility of a railroad across the Sahara has been carefully studied by French engineers, and the result of their studies seems to prove that a railroad can be run in almost any part of the Sahara. There are, however, two natural lines for such a (French) railroad to follow: the first from Algiers via El Aghouat, El Goleah, Ain Salah, Inziza and Timassaou to Bourroum, at the great bend of the Niger; the second, from Constantine, via the Hoggar mountain plateaus, Aghades, and Kano to Bornu and Lake Tchad, which the French hope eventually to connect by a railroad through Adamawa with the Gaboon.

We may, however, confidently look to the former of these lines being built first. The French now claim Tuat, which is halfway to Timbuctoo, and are busy annexing it, while they have not yet taken possession of the Hoggar plateaus in the same latitude. Moreover, the Arabs of Bornu or Sokoto are in much greater numbers and much more hostile to Europeans than are those of the region of Timbuctoo. Furthermore, a line to the great bend of the Niger would connect Algeria with Senegal directly and give the French a special strategical advantage, as from Bourroum they could control the navigation of the Niger, as well as be able to strike at the central Soudan and Bornu, and control the western Soudan by the railroad connecting Senegal with the upper Niger.

The country to be traversed is not at all what it is commonly supposed to be, namely, a bare and unproductive sand-plain. Much of the Sahara consists of hilly or mountainous country, with long valleys cutting through the hills; much of the remainder is composed of flat plains of earth, not sand, where trees and grass can grow. It is now believed that a large part of the Sahara was formerly well-wooded, but that the natives have continuously destroyed the forests to increase the pasture lands, thereby gradually drying up the surface water supply. From El Aghouat to Bourroum the railroad would be only nineteen hundred and twenty kilometres in length, and of this distance, the first half of the route, as far as Tuat, is well known, and shows the project to be quite feasible. Between Tuat and the Niger, although not yet surveyed, the route is believed to be comparatively easy, without any great stretches of sand and without sufficiently hilly country to necessitate either steep grades or sharp curves, either of which would materially increase the cost of traffic.

The difficulties of building the railroad are claimed by the engineers to be much less than is commonly supposed—intermediate between the difficulties which the Americans encountered in building the Union Pacific Railroad and those which the Russians met with in the construction of the Trans-Caspian road.

The difficulty of shifting sands and sand storms is usually considered an insuperable one, but it is seemingly greatly exaggerated. The sandy places are comparatively few and far between, and against shifting sands there is the very simple remedy which was adopted by the Russians in the construction of the Trans Caspian Railroad. Small palisades, about four feet high, are built parallel to the railroad and against these it has been found that the sand piles up without passing beyond.

Another great difficulty is considered to be the want of water; but soundings everywhere show that water is to be met with all over the Sahara at comparatively small depths, and with artesian wells, enough can be obtained to supply all possible wants. So far as opposition from the natives is concerned, it may be said that the negro population in the oases are generally friendly—at any rate, they are not fighters. The Touaregs are in small numbers, not nearly so savage as the American Indians, and they cannot fight unless they obtain access to the natural water-supplies of the country, the springs and wells. These are, however, not very numerous, and if the French seize and hold them, it would be all but impossible for the Touaregs to even approach the railroad line.

With the present activity in French exploration, the desire of the French for colonial expansion, and their present advance into Tuat, the Saharan railroad may be expected ere long to become an accomplished fact.

The climate of the Sahara, for eight months of the year at least, is said to be not at all unhealthy. During the night in winter the thermometer occasionally drops below the freezing point, and with properly built houses it is quite possible for Europeans to live there in comparative comfort.*

TYPES OF MANKIND—THE TAMILS.

CEYLON, in the eastern world, like Yucatan in the west, is a country of jungle and ruins—a region at one time largely populated, to-day, even with the workings of an European civilization which have crept into it during the last half-century, given over to the forces of nature to eradicate all signs of former greatness. Matted forest growth covers the sites of ancient cities, of architectural structures of rare and striking beauty, of monuments indicating a high degree of culture, or, at least, of knowledge—the work in the main of the people, who, shortly before the middle of the sixth century before the Christian era, took possession of the island, and who still constitute the great bulk of its population. The Cinghalese number to-day somewhat more than a million and a half of souls, or about two-thirds the entire population of

* News has been received of the occupation of Timbuctoo by the French.

A TAMIL GIRL.

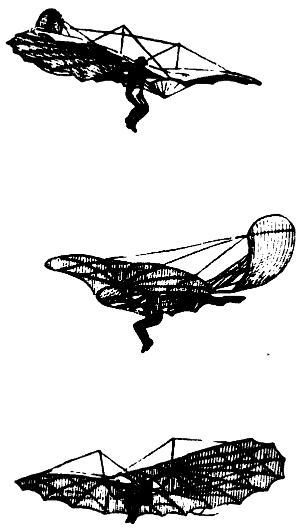
the island. Less numerous by nearly one-half are the descendants of their former subjugators, the Tamils or Malabars, who, in the thirteenth century, eighteen centuries after the advent of the Cinghalese themselves, made an incursion into the island from the neighboring mainland and took possession through the right of force. To them we owe the existence of the ruins as ruins—the demolition of temples and monuments, the degradation of wealth and splendor to the base level of usurping conquest. It would seem that two thousand years ago Ceylon supported a population probably twice that which it has to-day; over the largely depopulated region of the north, where almost impenetrable jungle now holds undisputed possession of the soil, and in which the wild elephant, bear and ape roam unmolested and unseen save by the denizens of their own wilds, where flocks of gay parrots disport noisily in the leafy boughs overhead, cultivated fields, smiling under the influence of an advanced system of irrigation, gave joy to the landscape. The remains of hill tanks and of abandoned towns—such as Anarajapura and Sigiri—testify to a former greatness, and show, as has been stated by a most acute observer, what the "rarest pearl in India's crown" may again become in the future.

Through that peculiar fall or decadence which so often follows rapid conquest, the Tamils have gradually sunk to low estate; the haughty spirit of the Cinghalese rarely deigns to notice them, and the two tribes, occupying an island not quite the size of Ireland, live mostly apart. Yet it is certain that of the two native races the Tamils, whom many anthropologists recognize as a remnant of the original inhabitants of Hindostan who were dispossessed of their belongings by the Aryan tribes advancing from the north, are the more vigorous, and to their greater energy and special powers of endurance is due the steady crowding out of the more indolent Cinghalese. Ernest Haeckel, the distinguished German naturalist, in his work, "A Visit to Ceylon," gives the following picture of these interesting people:

"The Tamils are as unlike the Cinghalese in stature, build, color and character as they are in speech, religion, manners and habits. The Cinghalese are mostly Buddhists, the Tamils worship Siva. The Tamils are always much darker skinned (coffee-brown, verging on black); the Cinghalese vary between cinnamon-brown and a sort of golden-tan color. Both have long, smooth, black hair, sometimes with a slight wave or curl, but never woolly. The beard is more abundant in the Tamil than in the Cinghalese, whose features, too, differ less from the Mediterranean type than those of the Tamils. In the Tamil the brow is lower, the nostrils are broader, the lips thicker and more projecting, and the chin heavier; the expression is grave and gloomy. I rarely saw a Tamil laugh, and never so gayly as is quite common with the Cinghalese. The singularly slender and feminine character of the limbs, which is so conspicuous in the Cinghalese men, is never seen in the Tamils; even the women are stronger and more sinewy. Still, the Tamil is far from being particularly bony or robust. He is, on the contrary, tall and graceful; the general proportions of his frame correspond so nearly with the artistic standard of beauty that the Dravida cannot be included among the inferior races of humanity—on the contrary, many specimens come remarkably near to the Greek idea. As their clothing, while laboring in the plantations, is restricted by the men to a small turban and a strip of loin-cloth, and by the women to a short petticoat and a loose handkerchief tied across the body, or a short, white jacket—and this is not unfrequently dispensed with when at work—a walk through the plantation affords ample opportunities for admiring the beauty of their forms. Their movements, too, are characterized by a certain native grace, which is fully brought into play in their different attitudes and occupations, for the labor in the plantations is varied and severe. How much better might a sculptor here study the true beauty and proportions of the human form among these naturally-developed models than in the life-schools of European academies, where some model, found with difficulty among the degenerate sons of civilization and forced into some unwonted attitude, is but a poor substitute for the genuine child of nature!"

THE SOARING OF BIRDS AND THE POSSIBILITIES OF HUMAN FLIGHT.

It may appear surprising to the non-scientific mind that, with the remarkable advances that have of late years been made in our knowledge of aerodynamics, one of the commonest occurrences in nature should still remain in the form of an enigma to the inquiring mind. That apparently simple phenomenon of gracefully circling or sailing in the air, known as the soaring of birds, however commonplace it may appear to every farmer's lad or country school-boy, has proved a problem of no inconsiderable dimensions to the physicist and physiologist, and thus far has seemingly baffled all attempts at explanation, unless, indeed, the explanation which is now offered by Professor Langley proves to be the true one. Nearly every observing person who is interested in the phenomena of nature has noted at one time or another in the course of his country rambles the "sailing" quality of the turkey-buzzard — the power of the bird to keep itself suspended and "intelligently" floating in the atmosphere without apparently moving its wings, or even the individual feathers of the wings, and as often as not sailing in directions having no special relations to existing aerial currents. This occurrence, on account of its seeming opposition to all the laws of nature, has, despite the facility with which it can be daily observed, been called into question by certain investigators, who professed to believe that a vibratory motion of the birds' pinions did in reality exist, but had in some way escaped the vigilance of all observers. Even the carefully made statement of the most accurate of naturalists was given little weight, and was assumed to be based on a misinterpretation. Mr. Darwin, in his narrative of the voyage of the *Beagle*, thus describes the observations made by him as naturalist to the expedition which has brought such remarkable fruit: "When the condors in a flock are wheeling round and round any spot their flight is beautiful. Except when rising from the ground, I do not recollect ever having seen one of these birds flap its wings. Near Lima I watched several for nearly half an hour without once taking off my eyes. They moved in large curves, sweeping in circles, descending and ascending without once flapping. As they glided close over my head I intently watched, from an oblique position, the outlines of the separate and terminal feathers of the wing; and if there had been the least vibratory movement these would have blended together, but they were seen distinct against the blue sky. The head and neck were moved frequently and apparently with force, and it appeared as if the extended wings formed the fulcrum on which the movements of the neck, body and tail acted. If the bird wished to descend, the wings for a moment collapsed; and then when again expanded with an altered inclination, the momentum gained by the rapid descent seemed to urge the bird upwards, with the even and steady movement of a paper kite. In the case of any bird soaring, its motion must be sufficiently rapid so that the action of the inclined surface of its body on the atmosphere may counterbalance its gravity."



EXPERIMENTS IN FLIGHT.

The problem in its varying aspects has, during recent years, attracted renewed attention on the part of experimentalists and theorists, with a result of leaving the question almost as dark as it had been a half a century ago. Latterly, however, the very interesting experiments of Professor Langley, of Washington, upon the constitution of wind, and the discovery by him that wind is not, as is commonly assumed, a steady blowing ***homogeneous*** air current, but a current of individual pulsating components—that is to say, a current having within itself rapidly varying velocities, actually ranging in one direction to an almost complete calm —have thrown new light upon the subject, and possibly afford even the true explanation. With winds of different velocities blowing within a wind, we have that condition of resistance in a medium brought about which is necessary for the propulsion of a body in flotation; in other words, very nearly the condition which is taken advantage of by a vessel blowing before or against a wind in the water. The potentiality of this so-called "internal work of the wind" is assumed by Professor Langley to be sufficient to "not only keep an inert body from falling, but cause it to rise, and that while this power was the probable cause of the action of the soaring bird, it might be possible through its means to cause any suitably disposed body, animate or inanimate, wholly immersed in the wind, and wholly free to move, to advance against the direction of the wind itself."

With regard to the internal components of a piece of wind, if so it may be termed, Professor Langley's researches have determined a most astonishing variation of velocities. In a special instance, the wind starting with a velocity of twenty-three miles an hour rose within ten seconds to a velocity of thirty-three miles, and within ten seconds more fell to its initial speed. It then rose within thirty seconds to a velocity of thirty-six miles an hour, "and so on, with alternate risings and fallings, at one time actually stopping." The following general conclusions are drawn from these interesting discoveries: "These observations and deductions have, it seems to me, an important practical application, not only as regards a living creature, like the soaring bird, but still more as regards a mechanically constructed body, whose specific gravity may probably be many hundred or even many thousand times that of the atmosphere. We may suppose such a body to be supplied with fuel and engines, which would be indispensable to sustain it in a calm, and yet which we now see might be ordinarily left entirely inactive, so that the body could supposably remain in the air and even maintain its motion in any direction, without expending its energy, except as regards the act of changing the inclination or aspect which it presents to the wind while the wind blew."

It appears likely that Professor Langley's investigations offer a clue to the proper understanding of aerial flotation or the soaring of birds, even if they do not, perhaps, remove the final mystery connected with that peculiar phenomenon. That lingering doubt still associates itself with the question of soaring and calms. So many observers claim to have seen birds soaring or "sweeping" in periods of absolute calm that it is made difficult to doubt the accuracy of their observations. Yet, if such is the case, some explanation other than that which is presented by Professor Langley must be considered necessary. It has been urged, however, that the apparent calm of the lowlands surrounding the investigator may be replaced in the more elevated realm of flight by steadily moving aerial currents, and that they would give the necessary propelling or supporting power. But travelers in the tropics who have made high-mountain ascents on isolated volcanic peaks have often expressed themselves in wonder regarding the constancy of the atmosphere — the absolute calm that seems to prevail everywhere. Due allowance must, therefore, be made from the assumption of probable upper aerial currents.

Some interesting experiments in "human" soaring have recently been made at Steglitz, near Berlin, by O. Lilienthal, who has constructed a special wing-like apparatus for this purpose. We reproduce drawings from instantaneous photographs of flights taken over an inclined descent of some 250 metres. Herr Lilienthal takes advantage of the upward coursing of the (generally assumed) horizontal winds of the plains, whose deflection is found to be, on an average, not less than three degrees. The extent of wing-surface employed covers fifteen square metres, and the construction of parts is such as to permit of shifting the centre of gravity relatively to the centre of resistance in such a way as to accelerate or retard at will the rate of movement. Runge, commenting on this new device, remarks: "Perhaps this is the road to flying. At any rate, it must be fine sport."

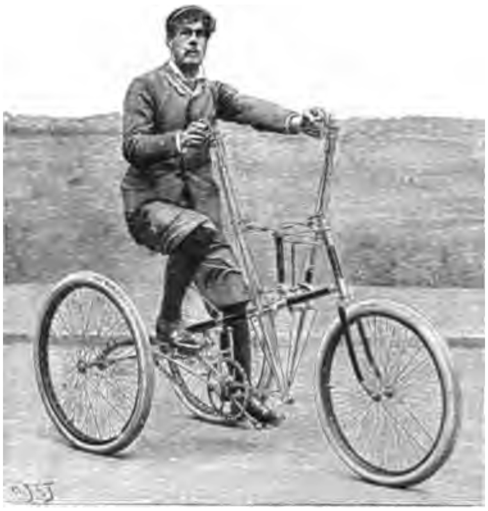
EPIDEMICS IN CITIES AND WATER FILTRATION.

MRS. FRANKLAND, wife of the well-known experimentalist, Dr. Percy Frankland, and herself an investigator of no mean ability, contributes to a recent number of *Longman's Magazine* an article on "Water Bacteriology and Cholera," in which the importance of sand-filtration (in the purification of water) as a preventive to the passage of disease germs is clearly brought to light. The evidence is based upon the behavior of the two almost contiguous towns of Altona and Hamburg during the late cholera epidemic. Mrs. Frankland writes: "These two cities are both dependent upon the river Elbe for their water supply, but whereas in the case of Hamburg the intake is situated *above* the city, the supply for Altona is abstracted below Hamburg, *after it has received the sewage of a population of close upon 800,000 persons.* The Hamburg water was, therefore, to start with, relatively pure when compared with that destined for the use of Altona. But what was the fate of these two towns as regards cholera? Situated side by side, almost contiguous in fact, with nothing in their surroundings or in the nature of their population to especially distinguish them, in the one [Hamburg] cholera swept away thousands, whilst in the other the scourge was scarcely felt; in Hamburg the deaths from cholera amounted to 1,250 per 100,000, and in Altona to but 22 per 100,000 of the population. So clearly defined, moreover, was the path pursued by the cholera, that, although it pushed from the Hamburg side right up to the boundary line between the two cities, it there stopped, this being so striking that in one street, which for some distance marks the division between these cities, *the Hamburg side was stricken down with cholera, whilst that belonging to Altona remained free.* The remarkable fact was brought to light that, in those houses supplied with the Hamburg water, cholera was rampant, whilst in those on the Altona side, and furnished with the Altona water, not one case occurred. We have seen that the Hamburg water, to start with, was comparatively pure when compared with the foul liquid abstracted from the Elbe by Altona, but whereas, in the one case, the water was submitted to exhaustive and careful filtration through sand before delivery, in Hamburg the Elbe water was distributed in its raw condition as drawn from the river."

If the data supplying Mrs. Frankland's observations have been correctly taken, and there is no reason for doubting the accuracy of her statements, then they carry with them but a single conclusion—the conclusion that the sand-filtration of water is a most important means for guarding the hygienic conditions of populous cities. A more conclusive demonstration of this condition has never before been given.

A NEW ROAD MACHINE.

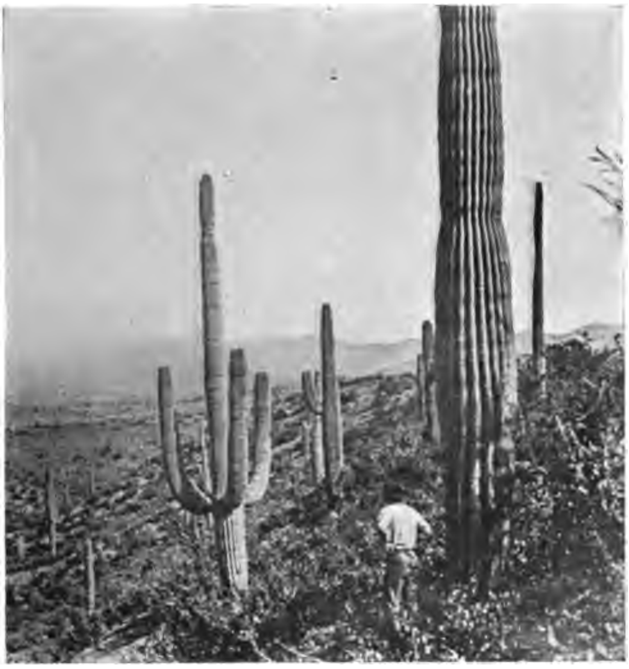
M. VALÈRE, of Paris, has recently invented a new tricycle which seems destined to effect a revolution in the construction of these justly-prized conveyances of travel. The improvement, which, so far as tests indicate, is a real one, lies in the application of arm force as an adjunct to the ordinary propelling power of the legs and feet. This is brought into play through an ingenious mechanism of hand-levers, which work synchronously with the pedal movement, and in such adjustment of pull and push as to harmonize with the movement which is habitually assumed in walking or running, particularly the latter; hence, the machine has been baptized the "running machine." An actual test of the machine indicates a very considerable gain in velocity over the ordinary wheels, and hopes are entertained that this gain may be fully equal to twenty-five or forty per cent., if not more. While with the cycle now in use each pedal revolution causes an advance of some eighteen to nineteen feet, the new machine, with its specially constructed lever-bar pedal, for a similar turn makes twenty-six feet; and a still further improved form, it is claimed, is now in actual construction whose development will be ten metres, or nearly thirty-three feet.



ANOTHER disaster, involving the life of a distinguished scientist, Prof. A. Milnes Marshall, of the Victoria University, Manchester, England, is added to the list of casualties which mar the pages of mountain exploration of the past season. The accident took place on the Scafell, a mountain of insignificant elevation and one offering but few difficulties in its ascent. It is singular that Professor Marshall's master, the late Professor Balfour, also lost his life in mountain exploration.

Around the World.

VOL. I. APRIL, 1894. No. V.



CANDELABRA CACTUS — MOUNTAINS OF MEXICO.

CURIOSITIES OF VEGETABLE LIFE.

THE CACTUS.

THERE is, if we except the palms and evergreens, and possibly the heaths, no group of plants which imparts so distinct an individuality to the vegetation of a country as the cactuses. Striking in habit, as they are almost anomalous in structure, they impress upon the eye of the traveler a picture of strange aberration —of broad departure from nature's ordinary types. Unlike the palms and evergreens, which under climatic limitations are distributed over a generous portion of both hemispheres, the eastern and the western, the cactuses are preeminently an American group—one might, indeed, say almost exclusively such, since there appear not to be over two or three species, representing the single genus Rhipsalis, whose habitat is outside of the American domain (South Africa, Mauritius, Ceylon). It is true that the Indian fig (*Opuntia ficus-Indica*) and some nopaleas have so largely taken possession of the soil of certain parts of the Eurasiatic and African continents, especially in the Mediterranean region, as to appear truly indigenous to those parts ; but a critical study of the wanderings of these plants makes it all but certain that they are strictly natives of the western hemisphere, whence through man's agency they have been distributed to broader fields.

Considerably more than a thousand assumed species of cactus have been described by botanists, and even after eliminating the forms which may be considered to be of doubtful standing, it is probable a full seven hundred will remain with a just claim to recognition as good species. These seven hundred or more species have an exceedingly broad distribution, extending from nearly the fiftieth parallel of south latitude, in Chili, to beyond the fiftieth parallel of north latitude in the Dominion of Canada. Mr. Macoun, of the Canadian Geological Survey, found in the course of his explorations three species of Opuntia (prickly-pear) in the region of Peace River as far north as lat. 56° 12', or where the thermometer occasionally descends to —55° F. Like one of the species of humming-bird which is said to occasionally visit parts of southern Greenland, or the tiger, which even in winter is not infrequently met with among the snows of Baikalia, so these forms, representing an essentially warm-climate group of organisms, carry the limit of habitation far beyond what might be properly considered to be the normal boundaries of dispersion.

The most southerly species of cactus known is the *Opuntia Darwinii*, from Port St. Julian, in the forty-ninth parallel of latitude. From this southerly point to the Canadian limit every zone has its cactus forms, but it is only when we reach Mexico that we find that remarkable concentration of species which makes these plants, apart from their purely physiognomic aspect, a dominating group of a regional flora. Only five orders of plants, according to Hemsley, are more largely represented in species in the Mexican Republic, and these are the composites (with upwards of 1,500 species), the pulses (Leguminosæ) and orchids (each with about 950 species), the ferns (with some 550 species), and the grasses (with a very nearly equal number). The Mexican cactuses number approximately 500 species, or nearly two-thirds of all the forms that are known to the botanist. It is here, among the plateau sands, on the slumbering volcanic cones, in the matted jungle of the lowlands, and on the sunlit-slopes of the limestone mountains, that the traveler meets with that remarkable assemblage of forms which never ceases to excite his interest and to arouse his curiosity. From diminutive balls of Melocactus, not larger than ordinary marbles, which scatter themselves along the surfaces of decaying lava boulders, to the still globular but vastly larger Echinocactus, with its heavy armature of hooked spines, and the five-foot bosses of viznaga (Mammillaria), and from the giant candelabra-like masses of the organ cactus or Cereus, whose trunks measure not infrequently forty to fifty feet, or more, in height, to the flagellate forms of the same genus which, snake-like, crawl over the trunks and branches of the lower jungle, and festoon them with an almost impassable net of stems and thorns, the eye follows a most wonderful range of vegetable development. Humboldt well says that the cactus is "one of the vegetable forms by which the aspect of nature is principally determined," and again that "there is hardly any physiognomical character of exotic vegetation that produces a more singular and ineffaceable impression on the mind of the traveler than an arid plain densely covered with columnar or candelabra-like stems of cactuses." Huge trunks, rising at times solitary in their grandeur, but more often branched into a number, from five to fifteen, of parallel columns, stand out as weird sentinels from the almost deserted landscape. The eye, indeed, hardly knows at first whether to consider them as vegetable products or as the constructions of man, so peculiar do they appear in their presence; only among the eastern euphorbias can we recall somewhat similar structures. In places the columns are only distantly scattered over the landscape;—elsewhere they are closely serried, making a true forest, from which, however, nature has permanently withheld the charm of a protecting canopy. Against the deep blue sky they stand like so many posts of a picket fence. Again, like a fence, they offer a barrier to the passage of both man and animal, for woe to him who hazards too near to the thorny ridges which rib the columns from top to bottom, and to which the brilliant blossoms of red and yellow only too determinedly invite! No more impenetrable abatis can be constructed than that which is grown from the organ cactus, and which is so freely used in Mexican hamlets to mark off the roadway and the individual properties.

In the arid and desert tracts of the southwestern United States the cactuses are as much at home as in the region beyond the Mexican boundary, and perhaps nowhere are the candelabra forms more typically and picturesquely represented. In the whole United States there are about 120 species of the order represented, but east of the Mississippi River the few species, some four or five, that are met with belong almost exclusively to the genus Opuntia (two or more species of Cereus are found in the Florida Keys). Visitors to the Falls of the Passaic, at Paterson, N. J., a few years ago will yet remember the luxuriance with which some of these "prickly pears" had implanted themselves upon the warm, sunny crags of that picturesque locality.

By non-botanists the thick fleshy or fibrous masses of the cactus are frequently assumed to represent the leaves, modified in a peculiar way, of ordinary plants. This is not the case. however ; the stem of the cactus is the correspondent of the stem of other plants, while the leaves are so far reduced or aborted as to be scarcely recognizable as such. One group of cactuses only, the pereskias, has true leaves. It would probably be difficult to name an order of plants in which the floral envelopes are more beautifully or delicately shaded than in the cactuses. From the deepest red to the most exquisite white of that "queen of the night," the night-blooming cereus of the Andean slopes (*Cereus nyctalicus*), we find nearly all the colors that are represented in other flowers, although there is a decided predominance of the red and yellow tints. As in color, there is also almost every gradation in size, up to the giant blossoms of the cereus, which would comfortably fill a large saucer, and the still larger blossoms of some Mammillariæ. On the other hand, Humboldt found the complete plant of a certain species (*Cactus nanus*) so diminutive as to trouble the dogs by getting between their toes Even in the dry season some of the forms, especially the melon-cactuses, are full of juice, a condition which is taken advantage of by the animals of the parched plains, such as the horse and mule, which extract the refreshing liquid by stamping it out with their hoofs. Not inaptly, therefore, the cactuses have been sometimes designated the "vegetable springs of the desert."

In their vertical range these plants pass virtually through all the vegetable zones, reaching in Mexico an altitude of 13,000 feet, and under the equator 15,000 feet, or within short distance of the snow-line.

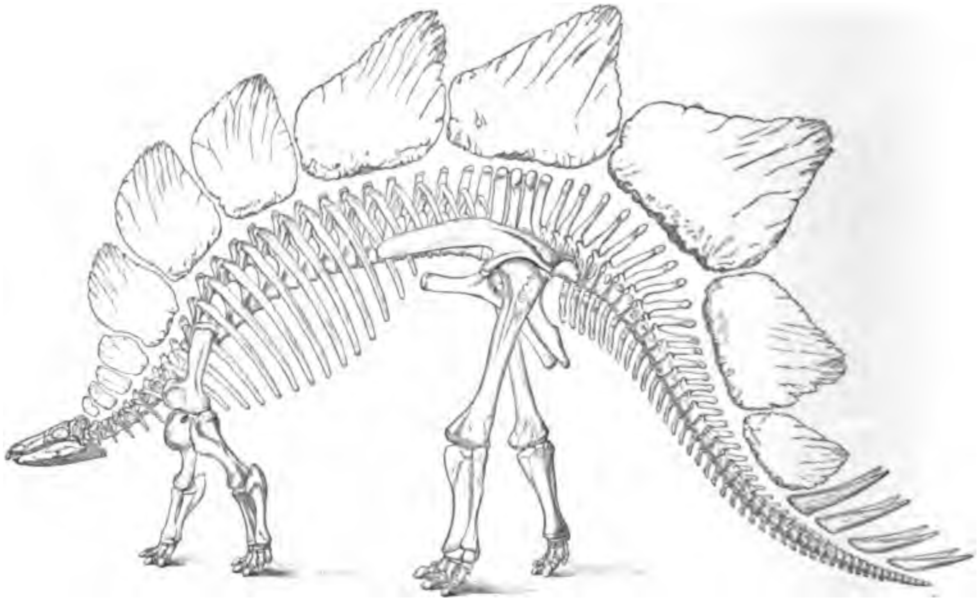
SOME ANCIENT INHABITANTS OF THE AMERICAN CONTINENT.

THE student of American history whose knowledge extends no further back than the period of the Spanish conquest, or the period of the giant piles of edifices which lie scattered throughout much of Mexico and Central America, has but a feeble conception of that history. Man and his immediate animal associates are to him the full chapter of his knowledge, and important and interesting as they undoubtedly are as subjects, they give no insight into that much more remarkable world of life and activity which preceded by ages the coming of man himself. In no other part of the earth's surface have there been so many extraordinary "pre Adamite" creations discovered as on the American continent—creations which arrest the course of the wildest imagination and give wonder to the expression of the scientist. The naturalists who less than a hundred years ago framed their systems of classification would, were they suddenly brought into contact with what the earth has since silently given out, be utterly bewildered in their conceptions of the organic universe—so wholly different are the parts to-day from what they were at the time of their own meditations.

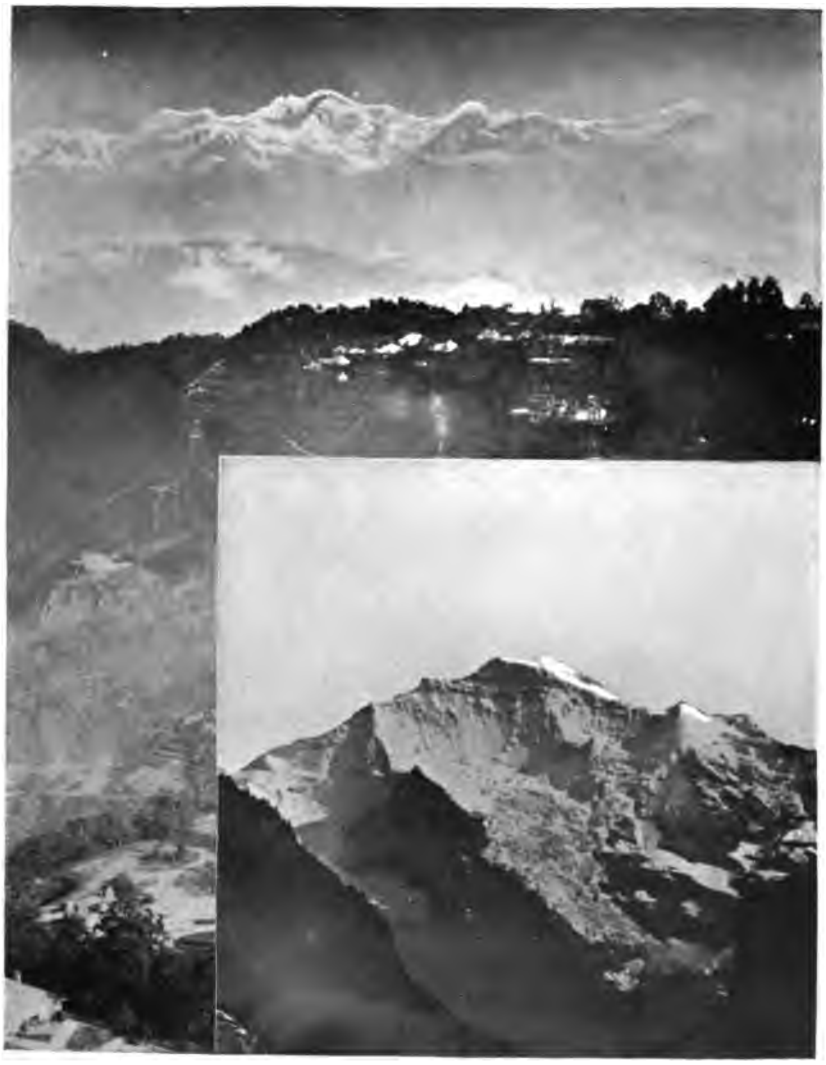
We illustrate in this article three of the more interesting and anomalous animal types which it has been the good fortune of Professor Marsh and his associates to disentomb from "ancient burial grounds" of Colorado and Wyoming. One of these, Brontosaurus, has been known nearly in its complete form a full decade ago, but it is only within recent years that the parts of the others have been found in such a way as to permit of nearly complete restorations of their skeletons. Perhaps the most interesting of these and in many ways one of the most strikingly peculiar of all animals, whether recent or extinct, is the form upon which the discoverer has bestowed the name of *Stegosaurus ungulatus*. This singular reptilian monster, which measured approximately twenty feet in length, and very nearly twelve feet in height, was, so far as it has been possible to determine, a vegetable feeder. Its most distinctive external features were the disproportionately small head, which was covered in front with a horny beak, the greatly elongated posterior limbs, and the series of great vertical plates and spines which traversed the median portion of the body and tail. Professor Marsh says of the last-named: "The series of vertical plates which extended above the neck, along the back, and over two-thirds of the tail, is a most remarkable feature, which could not have been anticipated, and would hardly have been credited had not the plates themselves been found in position. The four pairs of massive spines characteristic of the present species, which were situated above the lower third of the tail, are apparently the only part of this peculiar armor used for offence. . . . . . All these plates and spines, massive and powerful as they now are, were in life protected by a thick, horny covering, which must have greatly increased their size and weight."

The construction of the entire frame of the animal indicates that it was habitually a slow mover on all four legs. At the same time, the greatly elongated posterior appendages make it almost certain that at times the animal elevated itself in the manner of the kangaroo, a position to which the massive hind quarters lent themselves as a ready support. In this habit it recalled the Iguanodons and their allies (Hadrosaurus, etc.), to which, indeed, it was a close ally. Such parts of the animal as have yet been found were obtained from the Jurassic deposits of Colorado and Wyoming.

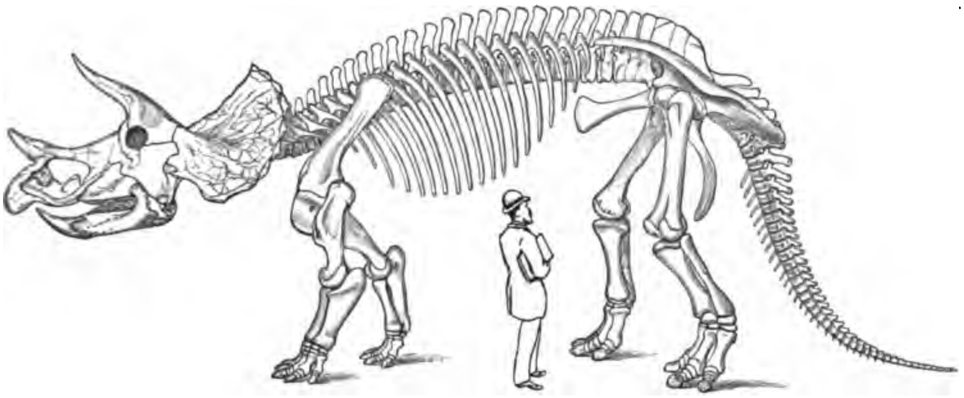
Scarcely less extraordinary in appearance than Stegosaurus, and somewhat surpassing it in size, was the animal which we figure as *Triceratops prorsus*. Its most distinctive feature was the gigantic horn-coated head and cephalic crest, the former carrying a remarkable armature of horns supported on true bone cores. From the fragmentary parts of a dermal armor that have been found in association with the rest of the skeleton, it would appear that the animal, like Stegosaurus, was heavily protected with plates and spines, but up to the present time it has not been found practicable to restore these to their proper positions. The length of the largest specimen known measures about twenty-five feet, with a height of ten feet. So little prepared were zoologists for the association of bony horns with reptiles of the group to which the fossil under consideration belongs, that when the frontal bones carrying the horns were first discovered they were



STEGOSAURUS UNGULATUS.



KUNCHINJINGA FROM DARJEELING.—THE JUNGFRAU.



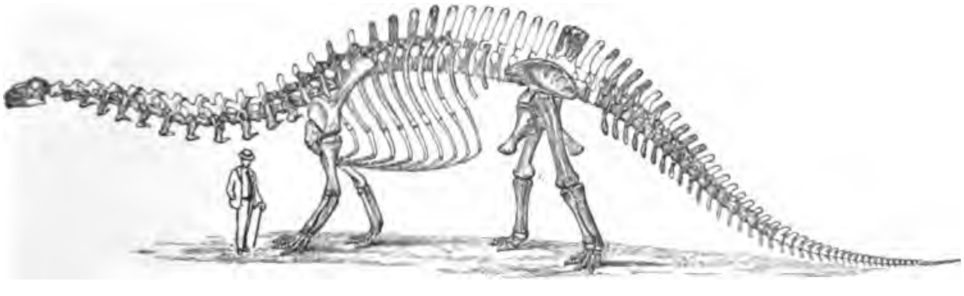
TRICERATOPS PRORSUS.

assumed to belong to a species of bison, and were described as such. Triceratops is from the transition beds (of Wyoming) which connect the Cretaceous and Tertiary periods.

Vastly surpassing either of the preceding in bulk was the giant *Brontosaurus excelsus*, a land animal which equaled in size very nearly the largest of whales. It is thus described by Professor Marsh : "The diminutive head will first attract attention, as it is smaller in proportion to the body than in any reptile hitherto known. The neck was very long and flexible. The body was rather short. The legs and feet were massive, and the bones all solid. The tail was very long and powerful. The animal during life must have been nearly sixty feet in length, and about fifteen feet in height. Its probable weight was more than twenty tons.

"Brontosaurus was herbivorous in habit, and its food was probably aquatic plants or other succulent vegetation. The skeleton here represented was found in the Atlantosaurus beds of the upper Jurassic, in Wyoming, west of the Rocky Mountain range."

The three reptilian monsters that have here been described represent the large and important group to which naturalists have given the name of Dinosauria—*i. e.*, "terrible lizards"—animals which in many points of their structure recall the wingless birds, such as the ostrich, emu and cassowary. Indeed, by many systematists, they are considered to be remotely ancestral to these, and to constitute the point of departure where the bird stock diverged from a reptilian stem. The points of structural relationship are found mainly in the disposition of the parts in the hind limbs and in the pelvic girdle, which are radically unlike what is to be found in nearly all the reptiles of to day. Most of the large foot impressions occurring in the rock deposits of the middle geological period, such as those of the Connecticut red sandstones, which were originally referred to birds, are now known to have been made by three-toed dinosaurs. What peculiar circumstances



BRONTOSAURUS EXCELSUS.

led to the extinction of these remarkable animals, whose remains are largely crowded in the deposits of the periods to which they belonged, cannot be told; their disappearance from the earth is one of those happenings in nature which lie in the vast problem of the succession of organic types and the survival through evolutionary processes of the fittest.

THE WORLD'S FAMOUS MOUNTAINS.—KUNCHINJINGA.

FOR a long time supposed to be the most elevated summit of the globe, and now known to be (positively) surpassed in height by only two other peaks—Mount Everest, with 29,002 feet, and the peak of Godwin Austen, situated near the northern apex of the Indian peninsula, with 28,274 feet—Kunchinjinga, or as it is sometimes written, Kinchinjunga and Kanchinjinga, is perhaps the most familiar by name of all the Himalayan summits. Lacking but little of the height of its peers, it rises as a gigantic colossus from the mighty chain of which it forms one of the most prominent features, and with a severity of outline which has by many been likened to a vertical sheet of ice. Hermann von Schlagintweit compared the aspect of Mount Everest, as seen from Falut, with that of the Mönch, as seen from Berne, and he draws a still sharper correspondence of form between Kunchinjinga and the Jungfrau. All who are familiar with the monarch of the Bernese Oberland will readily recognize in the outlines of the famous Himalayan summit, as they are depicted in the photographic illustration which accompanies this article, the full justice of the Schlagintweit comparison. No lesson in physiography is so impressively repeated as that of the recurrence of identical landscape features—be they dependent upon like or unlike geological construction. The modeling force of atmospheric agencies shapes the landscape, geological construction, as a rule, gives only an indiscriminate nucleus upon which to do the work.

It is generally conceded that the grandest scenery of the world is concentrated in the knot of mountains which unites the Sikkhim and Nepaulese Himalayas, of which Kunchinjinga is the most prominent feature. Viewed from the charming health-station of Darjeeling, or from an elevation of some 7,200 feet, it presents itself as the "distant boundary to the universe"—a rugged wall of glistening white. Clouds throughout the greater part of the year hover over its slopes, but the dazzling ice-crest stands out as a sharp contour against the deep blue of what has been described as an Italian sky. Range after range intervenes between the mountain and the spectator, but the true foot-hills have already been passed, and Darjeeling stands in the middle ground. Indeed, barely more than forty miles intervene between it and the giant peak—the distance being scarcely greater than between Chamounix and the Mont Blanc—and few localities in the Himalayas present such a favorable approach to the lofty summits as this much-frequented health-station, planted in the midst of luxuriant coffee, tea, and cinchona gardens. The dark forests clothe all the lower mountain elevations, and up to an elevation of some 12,000 feet "woods" of evergreens are still occasionally met with. A juniper (*Juniperus fœtidissima*) is here and there scattered up to 15,000 feet, but the true forest line virtually ceases at 12,000 feet, beyond which immediately succeed the Alpine meadows, with their brilliant covering of rhododendron and heath—a true garden landscape. Even to an elevation exceeding 19,000 feet (19,237 feet) Schlagintweit traced the final outposts of the flowering plants. To the region of mosses and lichens succeeds the abode of perpetual snow and ice, which on the southern face of the Himalayas descends to about 16,000 feet. Thus, the loftiest summits rise 12,000 and 13,000 feet above the snow-line, or for a belt equal to the full height of many of the more prominent peaks of the Alps. This vast snow accumulation is naturally the source of the most gigantic mountain glaciers of the world, which, in turn, are the fountain-heads of the powerful streams which at intervals break through the mountain barrier.

The most accurate measurements of Kunchinjinga give for it an elevation of approximately 28,158 feet. Like all the highest of the Himalayan summits it has never been ascended, but not unlikely with the advance that is yearly being made in mountain climbing it will before very long fall to the power of the daring Alpinist. The nearest approximation to its summit was made by Graham, in 1886, who ascended the Kabru, an off-spur of the main mountain, to an elevation estimated to be 23,700 feet.

THE PARAPHERNALIA OF AFRICAN TRAVEL.*

JAMES JOHNSTON, M. D.

THE intending traveler must be guided in the selection of his outfit and equipment by a knowledge of the nature and character of the regions through which he proposes to journey, as it makes a material difference whether his route lies through districts where occasional supplies may be obtained, or penetrates the interior beyond the boundary of supply stores.

Again, the facilities for conveyance of goods must be considered as, if wagons can be used, provisions for the journey may only be limited by the traveler's means; while if carriers must be procured, the less he can do with the better. To the latter class I would offer a few suggestions from my own experience, having special reference to Central Africa.

EQUIPMENT.—Personal outfit should include: tent, made of Willesden canvas, about seven feet by eight, with double roof, and tarpaulin ground-sheet for the floor; small folding table and chair; iron-frame folding cot weighing twenty pounds; a thin cork mattress; two or three blankets, large and of *good* quality, with a rug or plaid, and a small horse-hair pillow. Don't forget a piece of good mosquito-netting, and *never* pass the night, whether in a tent or in the open, without its protection, for it is undoubtedly a great preservation to health, the meshes shutting out the miasma, which is always worst at night. There are many ways of rigging up the netting, but the simplest of all is to take a piece of strong calico, say blue "pentado," seven feet long and three feet wide; around the edges of this sew a length of netting five feet wide; to each corner stitch a piece of strong tape, and the arrangement is complete. After the ground sheet, mattress and blankets are spread for the night, get four of your carriers' spears, and stick one into the ground at each corner, from which, by means of the tapes, suspend the net at a convenient height. After getting into bed, tuck the edge of the netting in under the mattress all around. But whatever shape you may adopt for your mosquito-netting, remember that it is positively indispensable.

A rubber ground-sheet is essential in case you require to sleep in the open; but this is the only article of rubber goods one need take, as air-pillows and such-like give way in a few months.

TENTS.—Tents are very useful in wet weather, but they get intolerably hot during the day, unless they can be opened at both ends to permit a free current of air to pass through; and this has the drawback that the contents are exposed too much to the prying eyes of the natives, and so exciting their cupidity. West of the Zambesi they may, without serious inconvenience, be dispensed with altogether, as the carriers prepare quite commodious round huts in an hour or two of sticks and grass, cool on the hottest day and warm at night, while if the thermometer goes down very low, a fire can be built in the centre. This cannot with comfort be done in a tent, as there is no outlet for the smoke, and in any case would destroy the canvas.

CLOTHING.—Two or three suits of good tweed might come in handy when approaching or visiting civilized centres; but for the veldt, good light-colored "elephant cord" will be found much more durable and satisfactory. It is most suitable for marching in the form of knickerbockers, and one jacket of this material will last a year, as it is only worn in the cool of the morning and after getting into camp; and it must be very rough usage that would require more than two or three pair of breeches. With these, thick, heavy worsted stockings must be worn; but when traveling through long grass, they need to be protected by leggings, say of canvas, as, if the grass is dry, it sheds small seeds and sometimes sharp needle-like burs, that are retained by the rough, woolly surface, penetrating to the skin and causing great irritation. The worsted stockings are at the same time a sure defense against ants of every description as, no matter how fierce, their mandibles get entangled in the meshes of the knitting, and thus are rendered harmless.

Footwear should be of two kinds. Light tennis-shoes of canvas, but not rubber-soled, are best suited for marching over sandy plains, but soon weary the feet if the path becomes rough or stony; here we must have thick-soled leather boots, a size larger than usual. I do not mean by this "top boots," such as are sometimes worn by sporting-men at home; they are found much too hot and heavy; but the shoe *par excellence* in dry weather is the native-made "*veldt schoon.*" For more than half my journey I used them in preference to every other, finding them noiseless in hunting and very easy to the feet. They are generally made with soles of buffalo hide and tops of "koodoo" or other antelope.

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*From "Reality versus Romance in South Central Africa." Reprinted by permission of the Fleming H. Revell Co.

Underclothing should be chiefly of wool, so as to avert the evil effects arising from chill ; and loose-fitting, to allow for shrinkage, as new travelers are not generally experts in the art of washing. The shirts should be made of a light, soft tweed, with a breast-pocket on each side ; if some of them are only half sleeved it would be no harm, as one generally prefers during the day to have the arms bare from the elbow, at least.

Headgear is purely a matter of choice. Some vote for the helmet of pith, cork, straw, or felt ; others, like myself, prefer an ordinary broad-brimmed light-colored Terai or wide awake. The helmet I find a nuisance. It gets knocked off in the jungle by the overhanging branches of the trees ; it is always in the way ; if you wish to rest at noon, you must either sit up so as not to crush it, or lie down without its protection, while the soft felt is obviously more accommodating.

NAVIGATION ON THE ZAMBESI RIVER.—SOUTH AFRICA.*

Firearms.—In reference to weapons, if firearms are carried for the sole purpose of procuring meat, a twelve-bore shot gun choked in one barrel and a .577 "Express" rifle D. B. will be found sufficient for ordinary game. But if danger from hostile natives is anticipated, in addition to these a few Winchester repeaters, 45.90 calibre, will be found invaluable. If a revolver is carried at all, it should be a big one, for the sake of the moral effect its appearance produces on the natives—a regulation Webley, and well plated, as this saves a lot of trouble in looking after rust-spots. As to cartridges, it will be seen, after my experience related on page 91, that it is of first importance that the intending traveler should get his goods from a trustworthy agent, or direct from the manufacturer, and then to personally inspect his ammunition, to make sure he is not taking old stock.

Barter Goods.—No specific advice can be given in reference to trade goods, as every separate district has its own peculiar fashion in beads, color or quality of cloth, size of brass, copper, or iron wire ; and information on this head can best be obtained from mercantile houses who supply the traders nearest to the point of entrance. But let it be understood that the goods above-named are standard currency in some form or other in every part of the country ; but this cannot be said of other articles often included among barter goods, such as clothes, hats, old military uniforms, fancy things, etc ; these will be received, but only as presents. Sometimes by hard experience one finds out how necessary it is to be sure what the market demands before purchasing, so as not to be laden with unsalable stuffs. A quantity of beads (fifty pounds weight) was sold to me by one in the country as the very thing required for barter in the different districts of the interior ; but after carrying them for three months, I had to deliberately throw most of them away in utter disgust, and feeling very sore at being swindled, for no native would accept them ;

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THE PET OF THE DESERT.

(From Field's "The Barbary Coast.")

and but for having procured a fair supply of the right kind from an *honest* man who had no wish to palm off his bad stock on an unsuspecting stranger, I should have been in a bad fix.

Trade cloth is generally done up by the wholesale houses in water-tight bales of from fifty to sixty pounds each, suitable in size, shape, and weight for a man's load. For personal baggage and sundries, tin cases are most suitable ; wooden boxes, leather portmanteaus, etc., are quickly destroyed by the white ants. The most convenient size for tin cases is 26x15x9 inches ; and I certainly would not be inclined again to spend forty to fifty shillings each on what are called water tight tin boxes. Six of mine were of this description, made by one of the best manufacturers in London. I never doubted their ability to keep their contents dry under all circumstances until two of them were thrown into the Zambesi by the capsizing of a canoe. On being recovered, they felt very much heavier than before, and yet there was no water dripping from them ; the fact was, they were water tight on the wrong side. The water got in easily enough, soaking the leather buffing round the rim, which swelled and effectually imprisoned it. They were full of water, and many of my most valuable articles, put there for special safety, were completely destroyed.

PROVISIONS.—Lay in a good stock of flour, rolled wheat, oatmeal, rice, barley and plain biscuits ; coffee, tea, cocoa ; dried fruit; desiccated potatoes, compressed vegetables; salt ; canned goods—corned beef, sardines, etc. Sugar is bulky and heavy, but will never be missed if to the above stock is added a few packages of saccharine tablets. Condiments, etc., will, of course, be included according to discretion. These foods named are the substantial stand bys.

But a few medical comforts and luxuries must not be forgotten, in case of sickness, such as extract of beef, arrow-root, condensed milk, preserves ; and a bottle or two of Cognac must not be omitted, as there are times of extreme prostration in attacks of dysentery, or as the result of fever, when a tablespoonful of this stimulant may turn the tide in the patient's favor. But alcohol in any form, except for medicinal purposes, particularly if taken through the day, is the shortest way to fevers, and renders the traveler less able to resist them when they come.

MEDICINES.—These are next in importance to food, and should be carefully selected, and not all put up in one medicine chest. Several small boxes, each containing a few special drugs, should be packed away in different cases, so that in the event of one or two loads getting lost, stolen or strayed there will be less danger of being without a remedy when attacked by illness, as has been the unhappy experience of some.

FEVER.—The principal disease, and from which none who penetrate the interior escape, is fever in some form or other, generally bilious intermittent, yet all too frequently, particularly near the coast, the malignant and dangerous remittent hematuric, or black-water fever.

Opinions differ as to the treatment of the various fevers, but most are agreed that quinine is our "sheet anchor ;" but I have much more faith in its effects as a prophylactic than in its antipyretic property, not only from personal experience, but also from the evidence of many I have met and on whose testimony I can rely. Five-grain doses of quinine daily while approaching or passing through districts known to be malarious, mitigated the severity of an attack, and often warded it off altogether, while others in the same caravan who neglected this precaution were completely prostrated every week or two ; but they also, on adopting the habit of a dose every morning, experienced almost complete immunity for months together.

Apart from the ever-exhaling malaria in swampy regions, long delays in camp, with their attendant worries, etc., sitting in damp clothes, whether from perspiration or rain, and omitting to change them on getting into camp, until one is chilled, are the most prolific causes of fever.

For fever recurring every day and continuing for weeks, quinine has but little antidotal power ; but it will generally yield to one tabloid of arsenic (1-50 of a grain) every four hours. Strychnine may be advantageously added to this, and can be obtained in the combined form.

WATER, generally so impure, is responsible for much of the fever and dysentery incidental to traveling in Africa. It should be the ambition of every one to train himself to accomplish the day's march without drinking, for it becomes very much of a habit, dipping from every pool or stream that one comes across, and only increases the craving for more. By a little exercise of self-denial, one will in a few weeks find he can cross stream after stream without any desire to drink, and on getting into camp a cup of tea or cocoa will refresh him, and thus avoid the risk of drinking unboiled water.

PHOTOGRAPHY.—It may not be amiss to give a brief sketch of my experience with photographic appliances, for the benefit of those who may wish to provide apparatus, material, plates, etc., for a similar campaign.

My outfit in this line consisted of a plain Waterbury 8x10 camera, with single back, rising front, folding tailboard, and hinged ground glass; one Ross 8x10 rapid symmetrical lens, and one 8x10 wide angle portable symmetrical. I had half a dozen holders for plates and half a dozen ditto for films, with vulcanite slides specially made for me by the Scovill & Adams Co., of New York, who supplied all my apparatus.

Five gross Carbutt 8x10 special plates, sensitometer 25, and three gross Carbutt films of same size and rapidity. These were packed in hermetically sealed zinc packages, containing two dozen each, and after developing were repacked face to face, nothing between, in their original form—a method which I can certainly recommend, as, though put to the severest test possible, all my negatives arrived in Jamaica without a single breakage or damage.

Developing material I carried dry; soda sulphite, soda carbonate, potash carbonate, acid pyrogallic, acid sulphuric; and for fixing, soda hyposulphite and alum.

One ordinary folding tripod with seven-inch top, three rubber trays, a folding ruby-lantern (procured from Watson, London), and one Thornton & Picard patent time shutter, completed my photographic paraphernalia.

I developed on the march only when there was no moon, when we chanced to camp by a clear running stream, my tent serving the purpose of a "dark room," and with such a provision, found no necessity for anything more elaborate. To avoid the conveyance of heavy dishes for the "hypo" and washing, I constructed bags of rubber cloth for the purpose, tacked upon frames, and carried a box to receive exposed plates, holding two dozen, replenishing my holders always at night.

Now as to results, I leave the reader to judge how far I have been successful in obtaining truthful representations of the tribes, etc., with whom I came in contact, from those I have selected for the illustration of this book from over five hundred negatives now in my possession.

The holders provided by the Scovill & Adams Co. never failed me, and their camera, though neither brass-bound nor leather-bellowed, did not suffer even the smashing of the ground glass; while the boxes containing my photo apparatus experienced the same rough usage as my medicine chest—carried on the head or shoulders of natives, by river in canoes, and through Bechuanaland and northward by wagon, and, like the chest, having been several times under water. Yet they are still as serviceable as when I first set out. Neither plates nor films showed the slightest signs of deterioration while they lasted. The only difficulty I experienced was with the films, which contracted three eighths of an inch, and thus could no longer be contained in the groove of the holder, but required to be kept in place by pins; this, however, could be easily obviated.

AT THE GATES OF THE DESERT.—BISKRA.*

BY HENRY M. FIELD.

WE were bound for the desert, but I cannot say, "Far off its coming shone!" Indeed, it gave no sign of its appearing. For a hundred miles that we bore southward, the country was one of great natural fertility, if not of high cultivation. Only the mountains were bleak and bare, as if they had been blasted and splintered by all the lightnings of heaven. In this work of destruction the waters have joined with the lightnings, as now and then great storm-clouds have rolled up from the Mediterranean, and been driven inland, to burst upon the mountains and sweep the soil from their rocky sides, which are thus exposed to the African sun. Here and there the cliffs rise up from the plain like battlements, with long, sharp crests, not broken by a single tree standing up against the sky. But this does not blight the fertility of the plains below, which are just now in all the beauty of spring. There are smiling landscapes that remind one of Brittany and Normandy, all the more that they are dotted here and there with little French villages. But these grow fewer as we get farther south, till there remain only the black tents of the Arabs, which are so low that they seem literally to squat upon the ground, like their occupants. Yet these tents swarm with life. Children are playing about the doors, while the masters are off upon the plain, watching their flocks of sheep and goats, in which I observed, for the first time, our old friend the American hog! But the most striking object in the distance is the shepherd himself, who is a type and a memorial, the representative of a race, as truly as the Indian on our western plains. It is the same figure that we recognize under an Italian cloak on the Roman Campagna. That figure is one of the oldest in history. Indeed, that solitary Arab, wrapped in his burnous, answers perfectly to the figure of the shepherds that kept the flocks of Jacob three thousand years ago.

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*From Mr. Field's "The Barbary Coast." Reprinted by permission of Charles Scribner's Sons.

While thus observing the tent-life and shepherd-life of these African plains, we are approaching the famous pass of El Kantara, through which we are to enter the desert. It is by no means so imposing as the Gorge of Chabet, which is over four miles long, while this is but three hundred yards. But it forms a noble gateway to the new aspect of nature that is soon to appear. As I looked up at the cliffs on either hand, it seemed as if the iron gates swung back before the rushing train, which, as it came on with smoke and flame, was no unworthy symbol of the new civilization that is to conquer the world. As we swept through the pass, we looked forward eagerly, expecting to be overwhelmed by the sight that would burst upon us. But nature does not make her contrasts so sharp and sudden, and softens the impression of the desert by placing at its very entrance a grove of fifteen thousand stately palms! Looking clear to the horizon, the landscape was still fresh and green, even while we were advancing towards a "great and terrible wilderness." Forty miles from El Kantara brings us to Biskra, where the railroad ends, and it was a surprise, indeed, to step from a luxurious railway carriage into a large and well-appointed station, and yet to know that we were actually in the Desert of Sahara! Yes, in the desert, but not quite of it; for Biskra is an oasis, from which the desert is so shut out by the encircling palms that we are on an island of verdure in a sea of desolation.

This remote spot has one supreme attraction in its winter climate, which, because of the distance from the sea, is never troubled by the mists and fogs that often enwrap Algiers and the Riviera. This has made Biskra, since it came under French control, a fashionable winter resort, with all the features of similar resorts on the other side of the Mediterranean. The town is laid out in the French style, with streets well paved, well watered, and well kept, and shops brilliantly lighted; and, as one sees the French soldiers marching through the streets, and hears the bands playing in the public squares, he feels that he is not yet beyond the limits of European civilization.

But he has not far to go to find the other side of the picture. A few minutes' walk will take him into the part of the town known as Old Biskra, where he will encounter the true children of the desert, the old race, and the old barbarism. To see all the native types together, he has but to visit the market-place. We went on the day before the beginning of Ramadan, the Moslem Lent, when for a month all true believers fast from sunrise to sunset. Of course they were eager to lay in a stock of provisions for the long season of penance and privation, and the market was heaped not only with things to delight the eye, but that were good for food. Here were dates and gums and spices, and wheat and barley, as well as leopard skins and ostrich feathers, and all the precious things of Africa.

But the chief attraction of the place was not in the market, but in the people, among whom were men of tribes which have been the terror of the desert. But the present scene was altogether peaceful, while it was full of the animation common at such very miscellaneous gatherings. Here a blind story-teller sat upon the ground, and told his tale in such musical Arabic that even foreigners could perceive that he was reciting poetry. This touched the Arabs' love of poetry and romance, and many left their buying and selling to gather round the poor blind creature, to whom they listened as the men of Bagdad listened to the tales in the Arabian Nights.

In the crowd of country-folk that poured into the town on this market day was an Arab, who went about with a gazelle, a beautiful creature that followed him like a dog. The natives are fond of domestic animals, and make pets of birds and beasts. The house dog is not more one of the family in our country homes than in the tents of the Arabs. Years ago, when traveling in the desert, I found that an Arab village or camp always betrayed itself by the barking of dogs.

But the most notable pet that has been on exhibition here has been a full-grown lion, that was so tame as to be led about the streets. True, he was not just out of the desert, where he had been taken in the toils, brought in as a prisoner, and subdued by the power of man. He was born in captivity at Marseilles, and showed such singular gentleness that he was not only let out of his cage, but followed his keeper about like a huge St. Bernard dog. When he was here in Biskra he was the show and the pet of the whole community. Not only did children run to see him, but their elders also, who came to look at him when he was stretched under a tree, and, eyeing him at first from a respectful distance, gradually approached till they would jump over him (a privilege for which each one paid a sou), thinking it would give them courage; and the old lion, whether it was that he was so gentle, or that he was too proud to notice such petty creatures, did not resent the familiarity, whereupon even the women grew bold, and, creeping up behind, gave a bound over the monster, thinking it would make them the mothers of those who should be the heroes of their tribe.

Those who come to Biskra for a winter, expecting to find all the gayeties to which they have been accustomed in Paris or Nice, may be disappointed, for it has not yet had such a flood of fashion that it can take its pleasures on a scale quite so extensive. But in its own primitive African way it has attractions that even the lovers of sport need not despise. If its races are not got up with all the splendor of the Grand Prix, yet it is a picturesque sight when the Bedaween dash by as they ride on the desert. Their feats on horseback always excite the wildest enthusiasm of their foreign spectators. But if one who is quite content with the races in the Bois de Boulogne would have a variety in his entertainment, he can have camel races, where the swift dromedaries, trained for the purpose, achieve a speed that takes him by surprise; or ostrich races, in which it is hard to tell whether the winged creatures run or fly; or, if he must have something with more of the element of the chase, he may be interested to see the falconers ride into the field, each with a bird mounted on his saddle-bow (and perhaps another on his shoulder) whose eyesight is keener and whose dash is swifter than that of man. Look at that bearded sheik as he tosses his bird into the air. Instantly it detects any small game running on the ground, upon which it darts with almost the swiftness of lightning. This use of birds in hunting reminds those who have been in India of the use which British officers make of animal intelligence when they go out with the cheetah, a species of leopard that is trained to hunting deer. As soon as it is let loose it snuffs the prey, and, crouching in the tall grass, creeps nearer and nearer, not to spring upon it, but to start it into the open, where the hunter can see it and spur his horse in pursuit; all which gives an excitement to the chase that the hunter could not find if he had to take his gun and plunge into the jungle alone.

But for those of us who care not for the race or the chase, Biskra offers a retreat such as one could hardly find, except in the heart of some great forest. A French gentleman with fortune, leisure, and taste—three things that need to be combined for such a purpose—has devoted himself to forming here a botanical garden, chiefly of tropical plants and trees. As the enclosure is a large one, including many acres, and completely filled, one may lose himself in its shades almost as if he were in the "pathless woods." But these are not pathless, for the grounds are laid out with exquisite taste, wide paths and avenues winding here and there, leading up to innumerable points of beauty. The effect of the sudden contrast—for this tropical garden is on the very border of the desert—is at once a surprise and an enchantment. Here one may spend hours, or even days, sauntering under the avenues of palms, or resting in some quiet nook, and forget all that is painful to eye or heart or brain in this poor, dull, weary world. And when it is remembered that all this is open to the public, it becomes a benefaction beyond all price to the poor as well as the rich; and those who are privileged to enjoy it, if they may not compensate him who provides it, may at least express their grateful appreciation of his generosity.

MR. WALTER WELLMAN, of Washington, representing the Chicago *Herald*, has been entrusted with the organization of an Arctic expedition, whose effort will be a "dash to the furthest north" by way of Spitzbergen. The expedition, the personnel of which is to be almost equally divided between Americans and Norwegians, is expected to be on the scene of operations in May or June of this year.

THE REVIVAL OF ANTARCTIC EXPLORATION AND OUR PRESENT KNOWLEDGE OF THE ANTARCTIC REGIONS.

THE EDITOR.

A REGION without a trace of animal or vegetable life upon it ; this is the picture to-day of all the land-masses lying within the Antarctic circle.

Simultaneously with the movement that has been inaugurated in this country for the exploration of the south-polar regions, the details of which were outlined in a late number of this journal, the Royal Geographical Society of London is seriously considering the desirability and urgency of organizing a like exploration under the auspices of the British Government. The principal mover in this projected enterprise is Mr. John Murray, the geographer of the *Challenger* Expedition, and for many years editor of the official reports of that expedition, than whom, probably, no more competent authority on the Antarctic regions exists. In a forcible address recently delivered before the Royal Geographical Society Mr. Murray emphasizes the special benefits to science that would accrue from such an expedition, and it is gratifying to learn that much of the warm support which the plan of the expedition received was from the side of the acquisition of pure and simple knowledge ; the sentiment of the assembly was seemingly voiced by the Duke of Argyll when he said : "I hope we have all arrived at that stage of civilization in which knowledge for its own sake is always admitted to be worthy of pursuit."

The plan of the expedition contemplates not a dash at the South Pole, but a "steady, continuous, laborious and systematic exploration of the whole southern region with all the appliances of the modern investigator. . . . Two ships, not exceeding one thousand tons, should, it seems to me, be fitted out for a whole commission, so as to extend over three summers and two winters. Early in the first season a wintering party of about ten men should be landed somewhere to the south of Cape Horn, probably about Bismarck Strait, at Graham's Land. The expedition should then proceed to Victoria Land, where a second similar party should winter, probably in Macmurdo Bay near Mount Erebus. The ships should not become frozen in, nor attempt to winter in the far south, but should return towards the north, conducting observations of various kinds along the outer margins of the ice. After the needful rest and outfit at the Falklands or Australia, the position of the ice and the temperature of the ocean should be observed in the early spring, and later the wintering parties should be communicated with, and, if necessary, reinforced with men and supplies for another winter. During the second winter the deep-sea observations should be continued northwards, and in the third season the wintering parties should be picked up and the expedition return to England."

It will be observed that the plan of the expedition contemplates an attack upon the Antarctic realm in much the same position as has been selected by Dr. Cook, the leader of the proposed American expedition—*i. e.*, the region immediately south of Cape Horn, and not where (due south of New Zealand) Ross, in 1842, penetrated beyond the seventy-eighth parallel of latitude, the nearest approximation to the South Pole that has yet been made. On the chosen line of exploration the Antarctic continent, if such it be, passes somewhat beyond the Antarctic circle, and is consequently brought within fifteen degrees (or about a thousand miles) of Cape Horn ; and the intervening islands make the actual separation still less. The outlying ice-sea is here of inconsiderable width, and can probably be traversed without great difficulty by any staunch steam-vessel. The comparative closeness to the American continent, too, offers advantages for escape by means of life-boats, in the event of the possible crushing of the main vessel or vessels of the expedition.

The knowledge which we to-day possess of the Antarctic regions is derived mainly from the researches of Captain Cook (1772), Weddell, James Clark Ross, Dumont d'Urville, Wilkes, and the officers of the *Challenger* Expedition ; such as it is, it is meagre in the extreme. Cook, Weddell, and Ross alone have penetrated beyond the Antarctic circle (Cook to 71° 10′, Weddell to 75°, Ross to 78° 10′), and Ross and d'Urville alone have set foot upon land within the Antarctic circle—not, however, upon "mainland," but upon outlying islets. The density of the pack-ice and the great vertical glacial walls which seemingly bound much of the continental area have been the chief obstacle to a successful penetration southward, and they have given the reasons for assuming that the region is practically unattainable. No unprejudiced mind can, however, consider the alleged inaccessibility as being based upon evidence, at least upon evidence of that kind which is likely to satisfy the modern scientific mind. For a full half century and more there has been no organized Antarctic expedition. Ross's brilliant exploits of 1841–42, when he twice penetrated to the seventy-eighth parallel of latitude, stand as the final monuments of a heroic effort to do in the south what has been so much more successfully accomplished in the north. Like the earlier north-polar expeditions, the expedition of Ross was accomplished without the aid of steam, and while it is not certain that in his particular case a further penetration southward could have been effected through the use of steam—a continental (?) coast line, that of Victoria Land, having interposed itself as a bar to further passage—it is positive that this advantage must stand in the same relation to Antarctic exploration generally as it does to the exploration of the opposite polar region. Only one steam-vessel thus far, the *Challenger*, has crossed the Antarctic circle, and no vessel, seemingly, of any kind has anchored within the Antarctic sea. With such an incomplete—one might, indeed, say inglorious—record of exploration, it would be vain to pride ourselves with knowing the possibilities or even probabilities of a well-directed effort at research southward.

Of the actual condition of the south-polar region we know only its upper dress—a covering of snow and ice, with traces of a land-area appearing here and there beneath the ice, or at intervals rising above it in the form of mountain and volcanic peaks ; outside of this are a vast ice-choked sea, floating giant icebergs, and scattered pools or basins of open water. Probably the sea portion of the region does not materially differ from the equivalent region of the north. Huge glaciers, both in the north and in the south, pour their giant masses into the sea where they break or float off as the familiar icebergs ; these cemented together with their fragmental parts and with the frozen surface of the sea—the "pans"—constitute the "pack." Wilkes applied the term ice-barrier not only to the vertical ice fronts which delimit the true glacial streams, but to the heavy and closely-set pack, and hence has arisen the belief that an impenetrable ice-wall or barrier guards the southern realm for an almost unbroken length of possibly 2,000 or 3,000 miles. While it is true that the ice-wall is in some places unbroken for a length of 200 miles or more—presenting on a considerably grander scale the structural features of Melville Bay—it is certain that over large areas no such wall exists, or, at least, that it presents avenues of passage, and that in such avenues landings on the mainland can readily be effected. Ross himself says : "Had it been possible to have found a place of security (for the ships) upon any part of this coast [Victoria Land], where we might have wintered in sight of the brilliant burning mountain [Mount Erebus], and so short a distance from the magnetic pole, both of these interesting spots might easily have been reached by traveling parties in the following spring." On the other hand, the intrepid commander, referring to the true ice-barrier, which he traced eastward for 200–300 miles, likens an effort to sail through it to an attack upon the cliffs of Dover.

The ice-wall faces the sea with a height of 150-250 feet, or with much the elevation of the lesser ice-walls of Melville Bay and the Kane Basin (Humboldt Glacier), and probably in both the actual thickness of the ice is not very different, in extreme cases being perhaps 1,200-1,500 feet. The belief that the great, flat, tabular bergs are characteristic of the Antarctic region, and that the pinnacled bergs belong to the north—a distinction that is frequently insisted upon by geographers and geologists—is erroneous. The flat, tabular berg—not showing, however, the signs of stratification so clearly as in the bergs of the southern ocean—is the distinctive berg of Melville Bay, where it is met with in hundreds or thousands, measuring a mile or considerably more in length and 100-250 feet in height. It is a part of the output of the great inland ice-cap, just as the similar bergs of the south are a part of the output of the ice-cap of that region ; and there is probably little, if any, fundamental difference between the ice-cap of the one region and that of the other, although it is by no means unlikely that the development of the southern ice-cap far exceeds that of Greenland. On this point, however, true light can only be obtained through exploration.

Whether or not a great connected land-mass underlies the southern ice can, likewise, only be determined through systematic exploration. Murray believes that such a continent does in fact exist, and that its area cannot fall far short of 4,000,000 square miles, exceeding that of either Australia or the United States. A height of land has been observed at many points of 2,000-3,000 feet, and isolated peaks (many of them volcanic) tower above this level still 10,000-12,000 feet (Mount Erebus, 12,367 feet; Mount Melbourne, 15,000 feet). To what ultimate height the ice-cap may attain in the interior cannot be foretold, but it is not likely to attain any very much greater elevation than the ice-cap of Greenland, 8,000-10,000 feet, and it would be in no way remarkable if it did not even attain this height. No probability sustains the assumption of the late Mr. Croll that this height may rise to ten or to even twenty miles; there is no question that long before this height could be reached a region would pass completely beyond the cloud-plane and enter into a zone of no-precipitation.

Of the geology of the great south-polar tract, in the absence of direct examination, we naturally know next to nothing. The greater number of the rock specimens that have been obtained from the outlying islands or dredged up from the marginal sea are of the continental type, and of that form which singularly enough falls almost invariably at the base of the continental series—the gneisses and granites and their allies. With these are the volcanic rocks, and the recent discovery of Tertiary fossils on Seymour Island—fossils of a type not unlike those described by Mr. Darwin from Patagonia—makes it not unlikely that even a sedimentary series of rocks may occur there.

The most distinctive feature of the Antarctic realm as we know it to-day, aside from the broad distribution of snow and ice, is that it supports no land flora or fauna. Mr. Murray thus expresses himself on this point: "No land animal, and no trace of vegetation—not even a lichen or a piece of sea-weed—has been found on land within the Antarctic circle. On Cockburn Island, in latitude 64° S., Hooker collected twenty cryptogamic species, three of them seaweeds, and this may be regarded as not far from the southern limit of terrestrial vegetation." It is, indeed, difficult to conceive of this condition when it is recollected that in Greenland, on the eighty-second parallel of latitude, or twelve hundred miles nearer to the Pole, flowers and butterflies are abundant, and that in Siberia, beyond the Arctic circle, the pines and firs are still of colossal proportions.

This remarkable absence of animal and vegetable life from the land-surface of the Antarctic regions is with little doubt a climatic condition, due primarily or almost entirely to the exceedingly low temperature of the *warmest* season. It does not appear that the average annual temperature of the south-polar realm is very much, if at all, lower than that of the antipodal region of the earth, but the summer temperature is, by comparison, an exceedingly severe one, the summer sun being barely sufficient to melt the winter snows even hundreds of miles before the Antarctic circle is reached. Thus, Clarence Island, in lat. 61°, which lies but little further poleward than the north of Scotland, is almost perpetually snowbound. It is true, and it is by no means unlikely, that more thorough exploration will reveal the existence of living matter where none of its traces have yet been discovered, but for the present the absence of life is the most marked feature of the Antarctic region.

On the other hand the Antarctic seas are replete with animal life and with those lowest vegetable forms, the diatoms, which so largely minister to the wants of the animal world. Murray well observes that the fauna of the floor of the Antarctic Ocean is "apparently more abundant and more peculiar than in any other region of the ocean's bed. . . . . This and similar trawlings show a larger number of individuals, genera and species than any single haul from similar depths in other regions of the oceans." It is over the floor of the southern ocean that the most impressive of nature's cemeteries is to be found—where animal remains are accumulating in untold numbers and silently uniting their parts to form the great bone-bed of the world. Some conception of the wealth of this animal deposit may be inferred from the fact that the trawl of the *Challenger* brought up in one haul upwards of 1,500 shark's teeth, many of them as large as the teeth of the giant sharks of the Tertiary period (*Carcharodon*) and in addition some fifty or sixty ear-bones of different cetaceans!

The question has been frequently considered, and it is still before the scientific world, as to whether the present Antarctic terrain was not at one time—indeed, of comparatively recent date—of much greater extent than it is to-day and whether it did not at one or more periods unite with Patagonia, South Africa, Australia and New Zealand. Many arguments have been brought forward in favor of this former extension, most of them drawn from considerations connected with the present and past distribution of animal and vegetable life—the relationship existing between many of the most widely separated forms, and the necessity for assuming for them a common origin. It is well known that certain closely related animal forms, such as the ostriches and their allies, for example—the true ostriches of Africa, the emus ot Australia, the cassowaries of New Guinea, and the rheas of South America—are pre-eminently sub-equatorial forms, belonging all of them, with the exception of the ostriches proper, to the austral regions ot both hemispheres ; similarly, nearly all the remains of birds which were most closely related to the ostrich tribe—such as the giant moas of New Zealand, the Dromornis of Australia, the Æpyornis of Madagascar, and the "herculean" Brontornis of Patagonia—are found in the same regions. The most distinctive Antarctic bird of to-day, the penguin, whose vast numbers scatter themselves over almost every land-tract lying south of the fortieth parallel of latitude, and still many degrees to the northward, so far as is known never appears north of the equator, nor have its fossilized remains ever been found this side of that line.

So, again, the great group of marsupials among quadrupeds—the kangaroos, wombats, etc.—is preeminently southern in its construction, for while it is true that in the American continent the opossums, which represent the group in the western hemisphere, are scattered widely over the north temperate and north tropical regions, they are yet only fragmental of the entire and exceedingly varied marsupial fauna whose habitat is the Australian region. Many other examples such as these could be cited, and equally from the vegetable and animal kingdoms, nearly all of which go definitely to prove that land connection in some form or other united the various tracts that have been referred to, and not improbably also projected the continental extensions quite to what now lies buried deep beneath the Antarctic ice-cap. Hooker, from a study of the flora of the Kerguelen, Crozets and Marion Islands, long since recognized the probability that these widely-separated islands were at one time either united to one another or formed part of a single archipelago. Darwin, Wallace, and Blanford have all conceived of the probbaility of a southern land connection, and latterly Prot. H. O. Forbes has marshaled many strong facts in favor of this condition. One of the most interesting of these is the recent discovery on the Chatham Islands, lying off New Zealand, of the remains of a large coot (*Fulica*) and of a giant wood-hen (*Aphanapteryx*), which had up till then been known only from the Mauritius, separated by an interval of nearly half the circumference of the globe !

It may be assumed without violence to any known facts that such a united main in the south may have existed, and, indeed such evidence as we have speaks very strongly in support of this conclusion. But it need not be assumed from this that the Antarctic continent was necessarily the birth-place of the distinctively southern fauna. Many considerations oppose this view. It seems, on many points of evidence, equally probable that some of the distinctive animal types migrated southward from the north, radiating off on the lines of the existing continents and their extensions, and then becoming isolated through the breaking in of the oceanic troughs. The remains of animal forms which appear to have been ancestral to the southern fauna do in fact occur in northern deposits, and of a very ancient period (Jurassic, Triassic). If it be objected that, in a migration from the north, some important remainings of the fauna pushing southward should have been left behind, it can be equally objected that with origination in the south, and subsequent dispersion in all directions, much of the migration ought to have extended beyond the southern domain. The problem is a difficult, though none the less, interesting one, and undeniably we have not yet arrived at a full comprehension of its intricacies. Possibly the new Antarctic expedition will obtain light in the dark regions.

ESKIMO LIFE.

IN an attractive volume* of three hundred and fifty pages the young hero of Arctic exploration, Fridtjof Nansen, who a few years ago made the "first crossing" of Greenland, and who at the present moment is embarked in perhaps the most hazardous venture in quest of the North Pole that was ever undertaken, gives a detailed study of the race of people with

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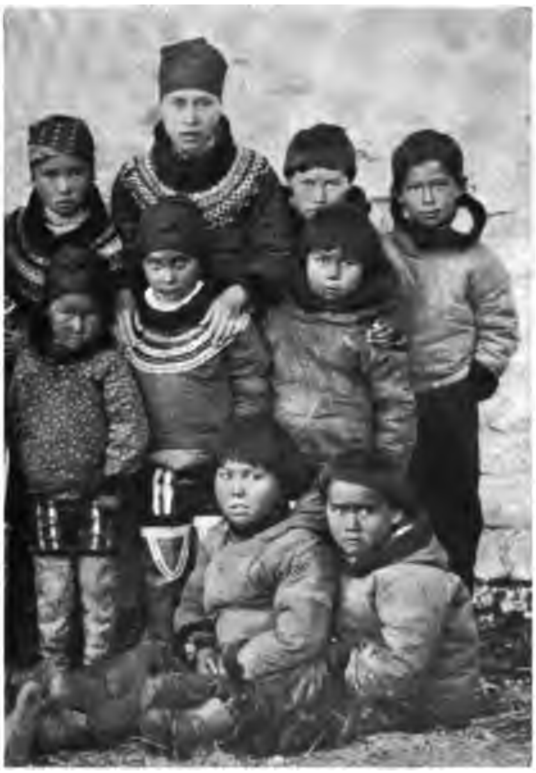
* Eskimo Life. By Fridtjof Nansen.—Longmans, Green, & Co., New York, 1893.



ESKIMO CHILDREN OF GODTHAAB, SOUTH GREENLAND.

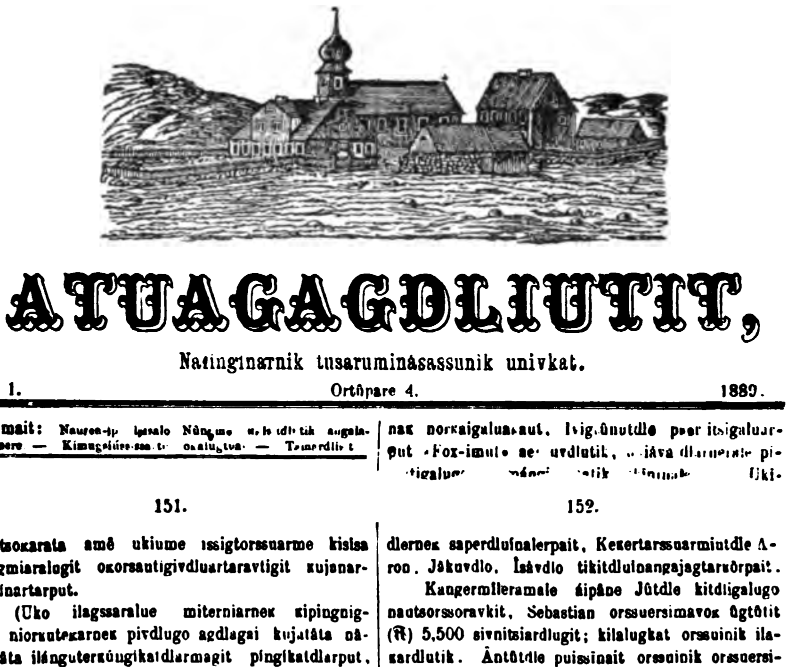
whom he was so intimately associated. Nansen is throughout a friend of the Eskimo; indeed, he treats of them with a kindly tenderness which is almost akin to reverence. He sees in these people—"the extreme outpost toward the infinite stillness of the regions of ice"—proof of a special adaptability on the part of the human species to accommodate itself to extreme conditions of existence, and of a native talent through which, "by dint of constant struggle and slow development," some things have been learnt that no other people have learnt better.

In the whole of Greenland, the region to which Nansen almost exclusively confines his studies, there are probably less than 11,000 of these singular people, very nearly 10,000 of whom, mainly half-breeds, inhabit the Danish possessions of the west coast, while possibly less than 600 are to-day found on the east coast, between Cape Farewell and the sixty-sixth or the sixty-eighth parallel of latitude. At the time of Clavering's visit to the east coast, in 1823, the Eskimo still inhabited that region as far north as lat. 74°, but the members of these more northern settlements have apparently either all died out or migrated southward. In northwestern Greenland, separated from the tract which is inhabited by the great bulk of the Eskimo population by the expanse of Melville Bay, is the abode of the so-called "Arctic Highlanders," or full-blooded Greenlanders, whose numbers to-day, seemingly not less than they were a half century or a full century ago, fall within the three hundred limit. Their most northern migrations extend not beyond the seventy-ninth parallel of latitude, although, even of recent date, they appear to have lived and wandered full two hundred miles or more nearer to the Pole; they are the most isolated people on the surface of the earth.

WOMEN OF CAPE YORK.—ARCTIC HIGHLANDERS.

Whence did these people come, and how did they effect the circuit of Greenland? These are questions to which the ethnologist has not yet been able to give a positive answer. That the migration into Greenland took place from the American side there is no reason to doubt, but this does not as yet dispose of the question of origination. The fact that the Eskimos occupy much of the icy tract of America all the way to Alaska, and again reappear in small numbers in northeastern Siberia, together with a physiognomic leaning in the direction of Mongolism—as is to be seen in their color, elevated cheek-bones, and obliquely-inclined eyes—has led probably the greater number of ethnologists to refer them to an Asiatic stock, a view which is not shared by either (the late) Dr.

Rink or by Dr. Brinton, both of whom have strenuously upheld their distinctively American (Indian) characteristics. Nansen throws no light upon this question, and contents himself merely with the facts of to-day—namely, that they have, "stage by stage, spread eastward over Arctic America to Greenland." It is true that he points out one assumed difference between the Eskimo and the American Indian, in that the former use dog-sledges. "With the exception of the Incas of Peru, who used the llama as a beast of burden, no American aborigines employed animals, either for drawing or for carrying. In this, then, the Eskimos more resemble the races of the Asiatic polar regions."*



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naĸ norĸaigaluaĸaut. Ivig[illegible]ûnutdle per itsigaluarput «Fox-imut» ae[illegible] uvdlutik, [illegible] iâva [illegible] pi- [illegible] Uki-

151.

ĸgitsoĸarata amê ukiume issigtorssuarme kisisa tingmiaralugit oĸorsautigivdluartaravtigit ĸujanardluínartarput.

(Uko ilagssaralue miterniarneĸ ĸipingnigdlo niorĸuteĸarneĸ pivdlugo agdlagai kujatâta nâlagâta ilánguterĸúngikatdlarmagit pingikatdlarput, sule aulajangersarneĸángikatdlarmat ĸipit niorĸutigerĸuneĸarungnaerumârnersut niorĸutigerĸuneĸáinarumârnersutdlûnît; âmalume misigssuissut tamána pivdlugo nalunaerutimingnik sule nagsiutaĸángingmata; kujatâtale nâlagâta ĸularutigíugilâ miterniarnerup puissingniarnermut audlanutdlo piniarnernut akornutaussássusia nalunaerutigineĸarumârtoĸ, tauvalo îmaĸa V. Hammeken-ip agdlagai misigssuissut suliainut pârdlangássaoralugit; imaĸa nalunaerutigissat katersorneĸarpata Atuagagdliutinut ilángúneĸarumârput.)

Nunaĸartingmiut niuvertorusiuvfigissartagkáta tamarmik sapingisánguamingnik umiagdlit umiatsiagdlitdlo katerssuivdluarniartartut erĸanârsarniartutdlo [illegible] ârtumut [illegible]ka.

152.

dlerneĸ saperdluínalerpait, Keĸertarssuarmiutdle Aron. Jâkuvdlo. Îsâvdlo tikitdluinangajagtarĸôrpait.

Kangermilleramale áipâne Jûtdle kitdligalugo nautsorssoravkit, Sebastian orssuersimavoĸ ûgtûtit (ℛ) 5,500 sivnitsiardlugit; kilalugkat orssuinik ilaĸardlutik. Ântûtdle puissinait orssuinik orssuersimavoĸ ûgtûtit (ℛ) 5000 sivnitsiardlugit. Ilaisa Kristiâp, Peter II. Amos I. ûgtûtit (ℛ) 4000 sivnitsiarĸôrdlugit; ilaile ikingneruvdlutik. Ukiordlo mána kângiugtoĸ Amos I amerdlanerssauvoĸ ûgtûtit (ℛ) 4000 nagdlingajagkamigit.

Kaĸutigorssuaĸ manisigângat aussamilûnît autdláinigtoĸartarpoĸ, autdlaisigdlit tamarmik ĸaĸutigorssuaĸ puissêrĸauigdlûnît pissaĸartarmata. Ukuale kisimik talinarmingnik piniuteĸarput: Amos I, Peter I (Pitâraĸ). Amos II. Boas II. Táukua siugdlît taissáka naulîgkajugtorssûput piniardluartorssûvdlutigdlo.

Titartaivfingnile Kangermiut ilaisa pissait igpingnardluinartarput ilarpagssue puiugauvdlutik [illegible] [illegible]

ESKIMO NEWSPAPER.—GODTHAAB.

Nansen draws the following picturesque outline of the pure-bred Eskimo: "He has a round, broad face, with large, coarse features; small, dark, sometimes rather oblique eyes; a flat nose, narrow between the eyes and broad at the base; round cheeks, bursting with fat; a broad mouth; heavy broad jaws, which, together with the round cheeks, give the lower part of the face a great preponderance in the physiognomy. When the mouth is drawn up in an oleaginous smile, two rows of strong white teeth reveal themselves. One receives the impression, upon the whole, of an admirable chewing apparatus, conveying pleasant suggestions of much and good eating. . . . To our way of thinking, such a face could scarcely be described as beautiful; but how much prejudice there is in our ideas of beauty! I soon came to find these brown faces, gleaming with health and fat, really pleasing. They reflected the free life of nature, and suggested to my mind pictures of blue sea, white glaciers, and glittering sunshine.

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* It would appear that the Apaches of the Plains used dog-sledges.

"It was, however, chiefly the young that produced this impression; and they soon grow old. The shrunken, blear-eyed, hairless old women, reminding one of frost-bitten apples, were certainly not beautiful; and yet there was a certain style in them, too. Toil had left its traces upon their wrinkled countenances, but also a life of rude plenty and a habit of good-humored, hopeless resignation. There was nothing of that vitreous hardness or desiccated dignity which the school of life so often imprints upon aged countenances in other parts of the world."

Differing from the opinion held by Dr. Rink, Nansen believes that the rounding of Greenland by these people took place on the south side rather than on the north, a view which has almost everything in its favor. It is generally agreed among ethnologists that the first settlement was made in the region of the Smith Sound, but it has been assumed that the great body of Melville Bay, with its projecting glaciers, offered an insuperable barrier to a direct migration southward along the coast; but even to-day the "Arctic Highlanders," when in pursuit of the bear, are known to occasionally follow the ice until within sight of the Devil's Thumb, the prominent landmark which looks over the southern entrance to Melville Bay.

Nansen bitterly laments the degenerating effects which a modern civilization has carried to his chosen people, and he metes out unstinted condemnation to the government which has essayed, in the name of good-will and liberalism, of morality and salvation, to convert the children of pure nature into modernized improvements. Perhaps other observers will not fully share the remarkable words with which he closes his interesting book:

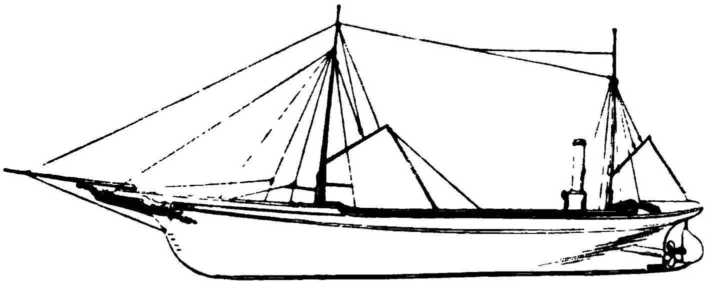
"If we ask, in conclusion, whether there is no hope of salvation for the Eskimo community, every one who knows the circumstances will be forced to admit that the only expedient would be for the Europeans gradually to withdraw from the country. Left to themselves, and freed from subversive foreign influences, the Eskimos might possibly recover their old habits of life and the race might yet be saved. . . . But apart from their intercourse with us, another danger threatens the Eskimos, to wit: the alarming decrease in the number of seals. This is not due to their own fisheries, in which the 'take' is infinitesimal in comparison with the hundreds of thousands of newly-born seal-whelps which the European and American sealers slaughter every year, especially upon the drift-ice off Newfoundland. Here it is again the white race which injures the Eskimo; but even if he knew of it, he would not have the power to set any limits to the abuse; his voice cannot make itself heard. Yet seal-hunting is an industry with which our society could very well dispense, while for the Eskimo the seal means life itself.

"Thus we find this lovable people inevitably destined either to pass utterly away or to decline into the shadow of what it once was. But the Greenlander bears up cheerfully, and is perhaps happier than we are apt to be; he does not realize his own ruin, and does not hate us, but gives us a friendly welcome when we come to him."

We append to this notice of Nansen's work a number of illustrations bearing upon Eskimo life. One of these is a reproduction from a native photograph of a group of children of Godthaab; another is the portrait of an aged dame and "belle" of Cape York, from the tribe of the so-called Arctic Highlanders; and the third is a photographic fac-simile of a native journal composed, published and illustrated by the Eskimos of Godthaab, South Greenland. The page refers to Nansen's crossing of the Greenland ice.

AN ALUMINIUM YACHT.

INQUIRY is frequently made regarding the possibility and the desirability of constructing yachts and other vessels out of aluminium, and it seems not generally to be known that practical tests in the use of the metal for the purposes here indicated have already been made and been followed with successful results. A complete aluminium yacht, the *Mignon*, constructed by Escher & Wyss, of Zurich, Switzerland, and intended for the navigation of the Seine, was launched on the Lake of Zurich on June 1, 1892. Its dimensions are: Length, 42 feet 11 inches; width, 5 feet 11½ inches, and height, 2 feet 10 inches, with a draught of water of 2 feet 2 inches. The yacht is divided into airtight compartments, and is said to be unsinkable. It is provided with a triple cylinder naphtha engine, which, with nearly all other parts of the machinery, is also constructed of aluminium. The little wood that it has been found advisable to use as an accessory in construction is all cedar of Lebanon. A cabin, measuring somewhat over eight feet in length, is situated in the front of the vessel, and occupies its entire width; its weight is approximately ninety pounds. The boiler is a spiral of copper tubing which, together with the two burners, is encased in a special copper compartment. In its entirety, inclusive of the machinery, the weight of the vessel is only 3,430 pounds, or barely more than double that of the ordinary wooden whale-boats and their oars. The speed attained on the trial trip was a fraction over eight miles an hour.



ALUMINIUM YACHT "MIGNON."

The introduction of aluminium into constructions of this kind will be watched with much interest by the traveler. It is needless to say that if it can be properly employed in the making of vehicles of transport, whether these be boats, carts or sledges, it will prove a most valuable aid to the explorer, especially in such regions where weight is calculated not only by the pound but by the ounce. Of almost inestimable assistance would be a light aluminium vessel in the many efforts that are being made to traverse the northern ice seas, even if it be but a simple row-boat, devoid of all machinery and machine appliances. Light in weight, it could be readily mounted on wheels or skids, and thereby subserve the double function of a navigator on either ice or water. It is understood that in the polar expedition of this year that is projected by Mr. Wellman aluminium constructions will be largely used.

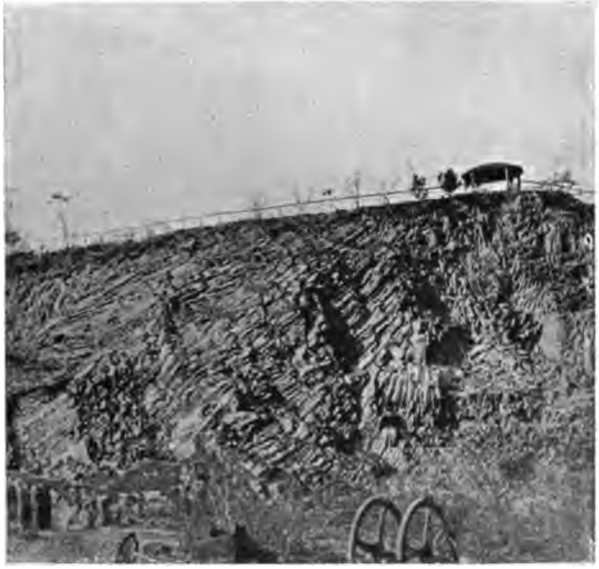
REVIEWS.

MOUNTAINEERING IN THE WESTERN SIERRAS. Sierra Club Bulletin, San Francisco.

The sixth of the series of publications of the Alpine Club of the west, bearing the imprint of January, 1894, contains some interesting descriptions and many useful hints to intending mountaineers regarding the American Sierras. The bulk of the pamphlet is taken up with accounts of the ascents of Mounts Ritter, Barnard, Williamson and Whitney, none of which seem to offer any special difficulties in the way of mountain climbing, although on the narrow backbone of Mount Ritter the climbing at times is likened to "navigating a picket fence." The detail of the Mount Whitney trail is especially minute, and will be found very useful to those attempting an "easy" mountain, whose elevation is not very far below that of the highest peaks of the Alps. Some fairly good views, photographic reproductions, illustrate the different articles, but they could readily have been improved upon with the possibilities which photo-engraving offers to-day. The Sierra Club Bulletin has the dress of the eastern "Appalachia."

Around the World.

VOL. I. MAY, 1894. No. VI.



BASALTIC CLIFF IN THE ORANGE MOUNTAIN.

THE PALISADES OF THE HUDSON AND THE ORANGE MOUNTAIN OF NEW JERSEY.

OF the thousands who almost daily pass within the shadows of the gray cliffs which for some fifteen miles or more bound the western bank of the Hudson opposite New York City few ever ask themselves the question what do they teach, or realize that they represent a type of mountain structure wholly different from that which is embodied in the ordinary mountain. Rising to a nearly uniform elevation of from 350 to 450 feet—in a few points to still higher elevations—and with nearly vertical faces for the better part of 200 feet, they constitute a true and almost unbroken palisade, unapproachable to the summit except at a few recessed spots where the dismembered rock has softened the severity of the face and planted into it a few retreating valleys. The summit itself, from which the eye takes in a broad sweep of distant landscape—the Sound, the Connecticut shores, and the proud river which lazily floats on the return current of ebb and tide—is nearly uniformly level, sloping off gradually to the river-valley of the Hackensack, which lies on the west.

To the geographer who takes a deeper interest in mountain forms than the simple beauties which they present, the Palisades offer a double attraction. They teach to him the lesson of certain activities within the earth, the manifestations of which must now be sought elsewhere. The rugged crags are a part of an earlier fluid or molten interior, tossed to their present positions through volcanic agencies—not, however, swept up in a great cataclysmic mass, like the upthrow of lava from a volcanic mountain, but gently squeezed out from a long line of fissure in the earth's crust. They are a true outflow of lava, which has solidified in vast sheets on the surface. What brought about this extrusion of fiery material, what caused the breakage in the crust which permitted of this outflow, are questions which cannot be safely answered; the very ancient period, measured by millions of years, at which the occurrence took place, has largely wiped out the testimony of the act, even if it has not dimmed the nature of the occurrence.

Compared with other structures the Palisades are a parallel of the formation seen in the Giant's Causeway of Ireland, and of the Fingal's Cave of the Island of Staffa. They, too, are solidified sheets of lava (basalt, trap), although representing for their formation a much more modern period of time. The peculiar columnar structure, resulting from the contraction of the fiery mass in cooling, which has made these localities famous, is only imperfectly exhibited in the Palisades; here and there stray columns, with almost perfect pentagonal or hexagonal outlines, are yet to be seen, resting on the subjacent red-sandstone, and even in the great cliffs themselves a tendency to columnar separation can be indicated. West of the Palisades, however, in a long parallel ridge which overtops them by about a hundred feet or more, and to which the name of Orange Mountain has been given, a grandly columnar structure shows itself at several spots. Less than a mile and a half from the peaceful town of Orange, in a face of the mountain that is exposed in O'Rourke's quarry, we have the finest exposition of this structure, and, such as it is, it need not be shamed by the greater grandeur of its European congeners. The exposure is about seven hundred and fifty feet in length, with a height of nearly a hundred feet, and over its entire face thousands of columns, occupying all positions, and measuring nearly all sizes, from the pigmy prism to giants nearly thirty feet in height, and four or five feet in diameter, are scattered in almost wild irregularity. The picture is every way a striking one, and worthy of a much more generous attention than has so far been bestowed upon it. It is only within the last few years that this remarkable locality has been made known, and to-day it already stands a chance of being forever ruined through the quarrying operations that are there being conducted. The assistance of the State should be invoked toward the preservation of its greatest natural curiosity; material for paving can be abundantly obtained elsewhere.

THE COLORS OF FLOWERS IN RELATION TO SEASON AND GEOGRAPHICAL LOCATION.

A PARTICULAR beauty of almost every landscape is the beauty of its flowers. The gleam of color which they throw out is a relief from monotonic severity, and frequently it constitutes the entire charm of a region. What would be the steppes and tundras without their rich carpet of flowers, or the heaths without their heather and gorse? They would, indeed, be like a diadem deprived of its precious jewels. Few there are who do not appreciate this form of beauty, but until the last few years, when the Darwinian epoch ushered in new paths and new methods of exploration, there were not many to probe beneath the simple surface of its existence. The question of color, the relations of color to special conditions and habits of life, were not a part of the enjoyment which the flowers afforded.

In a paper published in the Canadian *Record of Science* on "The Colors of Flowers in Relation to Time of Flowering," Mr. S. T. Drummond thus sums up the new science: "A new interest has, during recent years, been given to the study of plant life by the researches of Wallace, Darwin, Lubbock, Grant Allen and others. We had been led to think, and it seemed a natural conclusion, that the fragrant odors, the brilliant colors, the varied forms and the distinctive habits of flowers were all intended for the pleasure and education of man. There had been the suggestion that these characteristics had their part in the economy of the plant itself, but this suggestion had not attracted much attention. Now we find that in at least a very large number of plants, the beautiful tints and the curious shapes of the petals and sepals, the honey which flowers secrete, and the odors, fragrant or offensive, which they give out, all play their part in the processes of reproduction, by attracting to them insects which unconsciously, in their turn, carry the pollen from one flower to another, and thus perfect fertilization. Whilst the color, the scent, the honey or pollen forms the object of the insect's visits, the plant has in turn, in process of long time, adapted itself in habit and in the brilliancy of hue and in the shape of its flowers to attract the insect, and cause it to carry the pollen from flower to flower and plant to plant."

It is a fact, and the observation has been as frequently made by the layman as by the scientist, that flowers of certain colors are more abundant at certain seasons of the year than at others; that while some colors are more or less distinctive of the early months of the year, others appear in abundance only later, and this is true, as Mr. Drummond says, "not merely of the great masses of flowers taken as they appear, month by month, without reference to species, but also in relation to the species themselves. Every one who has collected flowers must have observed that whilst in the spring white is the predominating hue, and in August yellow prevails, the month of September is characterized in our latitude by the preponderance of tints of blue and purple. Sometimes a few species will, through the great abundance of the individuals of each, or the size of their flowers, give to a locality the preponderating color. Thus, in early spring, the blood-root and the trillium, in patches here and there, mottle the ground with white, whilst in August and September the golden-rods and the asters give the yellows and blues of the foreground of our landscapes."

In order to ascertain the true relation which the different colors bear to one another—not by mass, but as representing individual species—month by month, for the northern temperate region, Mr. Drummond has carefully tabulated the "flowering months" of 539 species of plants of Ontario and Quebec, and the result obtained is an interesting one. The period covers practically the entire growing season. We reproduce here his table :

Number of species blooming in	April.	May.	June.	July.	Aug.	Sept.	Oct.
White flowers.	16	73	82	79	50	23	12
Yellow "	8	23	34	49	73	52	2
Blue "		14	14	17	16	21	17
Violet and purple	6	14	25	33	22	27	14
Green flowers	6	13	17	14	7	3	1
Rose, pink and red		11	8	8	6	3	

This enumeration makes clear the preponderance of white and yellow flowers over those of any other color, and secondly, that the months from April to June are preeminently "white months," August and September "yellow months," and October a "blue and violet month." It should be noted, however, that the blue of October is not due to a special development of flowers of this color, but to the rapid falling away of the colors (white and yellow) which first appeared; indeed, the blues, purples, and violets (taken collectively) show their maximum development already in July, the month which has a greater number of flowering species than any other.

Observations similar to those of Mr. Drummond had already been made by Dr. A. W. Bennett, in England, in 1881, but on a somewhat more limited scale. He found that of 64 common "early spring" flowers, or those blooming not later than April, 26 (or 40 5 per cent.) were white, 9 (or 14.1 per cent.) green, 13 (or 20.3 per cent.) yellow, 5 (or 7.8 per cent.) red or pink, and 11 (or 17.4 per cent.) blue and violet. As compared with the other colors, therefore, white showed a great preponderance, yellow was also in excess, while the red and pink were scant. A study of 51 Alpine plants of the month following (May) showed a striking departure from this result in the large proportion of the red and pink flowers, which constituted full 27.4 per cent. (as against 35.3 of the white and 19.6 of the yellow) of the entire number.

"It had been suggested," says Mr. Drummond, "that the flowers which have undergone least modifications are usually yellow or white, or, in other words, that these are more or less original colors among flowers, a higher development leading to pink, red, purple and blue. Grant

Allen has gone further in considering that 'all flowers, it would seem, were in their earliest form yellow ; then some of them became white, after that a few of them grew to be red or purple, and, finally, a comparatively small number acquired various shades of lilac, mauve, violet or blue' . . . . Judging from the flora of northeastern America alone, I should have been inclined to regard white as the earliest, as it is, in our latitude, a preponderating color among flowers. There is an intimate association between light and the development of color among plants. Where light plays a less important part, as among night flowers, the tints of the petals are white, as if that were the starting color. The colors of the spectrum, separately, and blended into one as white, are, besides, the colors we meet with among flowers. Again, variation in color in the same species is a well-known feature in some of our American forms, but this variation is, as a rule, from purple, blue or rose to white, or the reverse." Mr. Drummond instances cases in the violet (*Viola cucullata*), mimulus, speedwell, hepatica, and among certain asters and the bluets, as showing this "reversion" to a white color, and he adds: "Should this variation be regarded as, in any sense, progression or degeneration, the tendency would be from or to the original color, and it is but rarely with us that the tendency is to or from yellow."

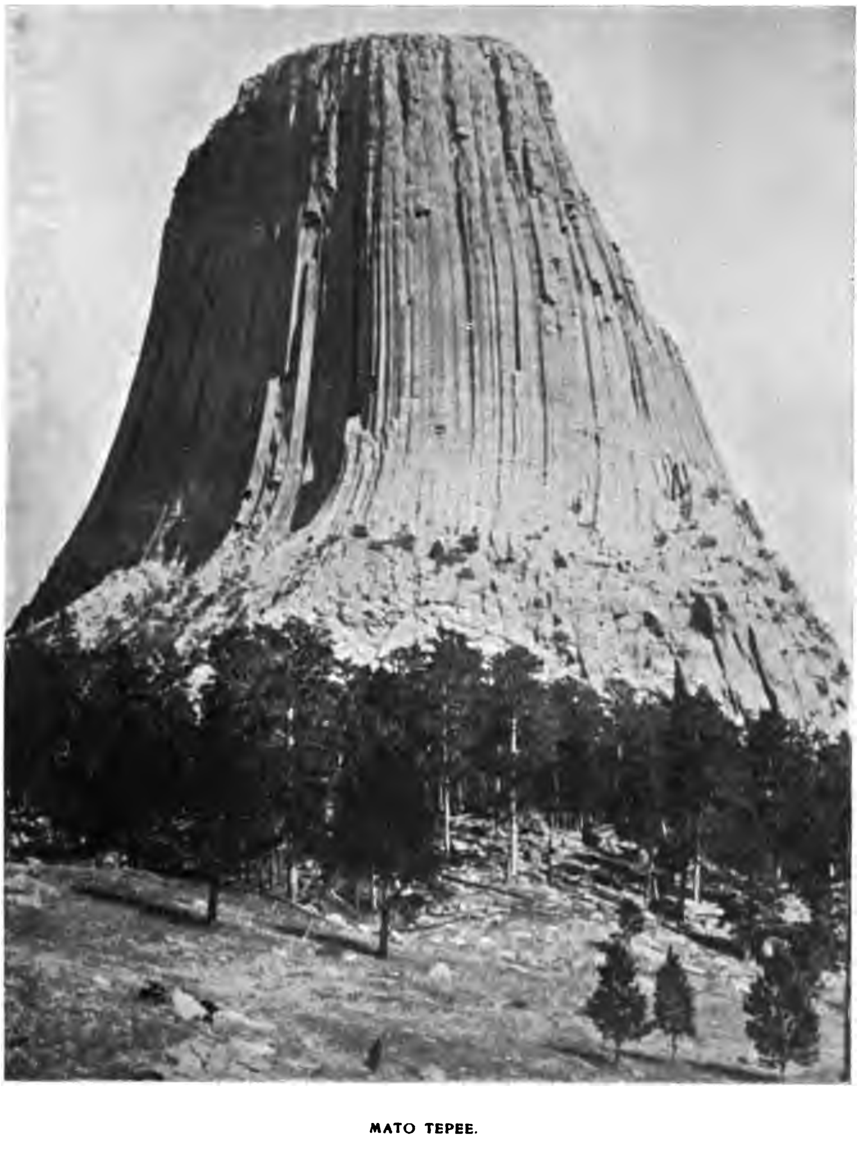
This interesting speculation as regards a possible evolution in tint from a primitive white is, however, largely negatived by an important fact which Mr. Drummond appears to have overlooked, and that is : the white is not a true color of pigment, as are the other colors, but is merely the result of the presence of a very large number of air-cells—which might be said to break up color—just as the "color" of white snow is due to the same cause. The fluid pigments which make bright colors require a special quantity of light and heat for their development, and hence the appearance of brilliantly colored flowers in the more luminous and warmer parts of the season, and their comparative absence from the dark and chilly first months. Bonnier has long ago shown that in the upper regions of the Alps, where there is an excess of sunlight, the flowers, of the same species, are more intensely colored than in the lower tracts, over which the shadows of darkness rest for a much longer time. Similarly, in the Arctic regions, the exceedingly luminous, though short, growing season—restricted to a minimum of months in the year—develops an extraordinary multitude of showy flowers —yellow, red, and violet ; and again, in the tropics, where heat is largely the developing agent, we find the same condition. It is there, more than anywhere else, that white is replaced by the reds, orange, blues, purples, and violets. There it is seen that the colors of flowers are directly related to the seasons in which they occur, while at the same time they reflect a distinct geographical condition. Dr. Bennett, contrasting the early British flora with that of the Alps, recognizes in the earlier spring, the clearer atmosphere, and the brighter sun of the latter region the factors which give to Switzerland its glow of incomparable rose and pink silenes, ericas, and primulas, and the blue of its gentians and soldanellas.

MATO TEPEE.

ISRAEL C. RUSSELL.

ON a brilliant autumn day I stood on the verge of a table-land in northwest Wyoming and saw for the first time the majestic rock-tower which is known to the Indians as Mato Tepee or Bear Lodge. At my feet lay the valley of the Belle Fourche, with its groves of cottonwood trees, yellow as the harvest ; beyond was the ashen-gray desert, without a sign of life ; and farther still, like a shadow on the sky, rose the Big Horn Mountains. To the north, rising boldly from the valley, loomed Mato Tepee, its single massive tower appearing like the keep of a great castle. From each point of view, as we traveled toward the unique object, it became more and more clearly defined and more and more impressive. Our eyes were drawn toward it as if by magnetic attraction. At sunset we spread our blankets near the base of the structure, with only the trees and the sky above us, and our wonder increased as the massive walls reflected back the color of the western sky.

During the silent watches of the night the dark, impenetrable mass appeared even



MATO TEPEE.

more majestic than by day. At times the clustered columns on its sides of "alternate ebon and ivory" stood out clear and sharp in the moonlight, and again its summit was shrouded and lost to view in the night mists.

Impressive as the tower appears from a distance, its colossal size cannot be fully realized until one climbs to its immediate base and gazes upward along its pilastered walls. The more familiar one becomes with its details the more awful are its rugged cliffs and the more inaccessible appears its untrodden summit.

Mato Tepee is grandly placed. It stands alone, without support and without rivals. Its pedestal is a dome-shaped hill, rising 500 feet above the encircling river. The massive column itself is over 600 feet high, making the total elevation of its weather-beaten summit more than 1100 feet. Its proportions are in keeping with its elevation and render it symmetrical as well as imposing. It forms the dominant object in the landscape from every point of view within a radius of many miles. Like a crag-built castle, it is always in bold relief against the sky.

The hill forming the pedestal on which Mato Tepee stands is composed of brightly-colored shales and sandstones, and is not the ruin of an ancient volcano as its form might suggest when seen from a distance. The shaft itself is of dark igneous rock and has a strongly pronounced columnar structure. The fluting on its sides, suggestive of Doric architecture, is not superficial, but is due to the fact that the entire structure is composed of distinct and separate, but closely fitting prisms, which extend from its base to the summit without joint. The cyclopæan masonry is in vertical instead of horizontal courses. Each prism has from five to seven sides and is from six to ten or twelve feet in diameter; near the top they are somewhat fissured and discolored from long exposure. The prisms are similar in origin to the well-known examples of basaltic columns at the Giant's Causeway and on the Isle of Staffa, but are far greater in size and form a more impressive structure than at either of those renowned localities.

The shaft of Mato Tepee is by actual measurement 625 feet high; its diameter at the top is 376 feet and at the bottom 750–800 feet. In cross-section it is rudely rectangular. The prisms of rock composing it are vertical, except at the foot of the west wall, where they curve abruptly outward and become nearly horizontal. About its base there are confused heaps of broken pilasters and shattered columns which have fallen from its sides, forcibly suggesting the ruins of a mighty temple.

Romance has not woven a deceptive veil about this wonderful tower, and there are no poetic legends of its having been conjured into existence by the magic of wizards or demons; but a brief, unadorned sketch of its mode of origin may not be without interest

The shaft of Mato Tepee was formed by an injection of molten rock, from deep in the earth's crust, through stratified layers of shale and sandstone. The intruded material did not reach the surface and form a lava flow or a volcanic crater, as has been the case in many similar instances, but cooled and hardened, developing a prismatic structure while yet deeply buried. The general surface of the region was then at least two or three thousand feet above the present surface and has since been lowered by erosion. The rocks were worn away by the action of rain and rivers until the present topography was produced. One of the streams which flowed across the ancient land-surface chanced to pass near the site of Mato Tepee, and year by year, and century after century, slowly deepened its channel and broadened its valley. The soft sedimentary beds which had been arched upward into a dome by the intrusion of the plug of igneous rock from below were removed, and the summit of the present shaft formed a low hill in the desert.

As erosion progressed, the strata were gradually removed from around the intruded rock and the tower-like form was slowly developed. The buried column thus rose slowly from the earth by the washing away of the surrounding material, and became a monument of grand proportions and majestic height, worthy to record a page in the earth's history.

There are other hills and isolated buttes in the neighborhood of Mato Tepee which are of the same general character and serve to illustrate all phases of the history sketched above, but none of them have reached such a perfect development as the example here described.

Little Sundance Hill, near the town of Sundance, on the west side of the Black Hills, Dakota, is a symmetrical dome of stratified rock, half a mile or more in diameter, and is similar in all respects to the dome which once arched over and concealed the summit of Mato Tepee, but it has not yet been dissected so as to reveal the intruded igneous rocks beneath. Later stages in the same general history are portrayed in Bear Butte, Black Butte, Inyan Kara, and other similar elevations about the northern border of the Black Hills. Each of these conspicuous landmarks has been formed in the manner of Mato Tepee, but in none of them has the intruded mass of igneous material been so thoroughly exposed to view, and in none is that remarkable tower-like form and monumental grandeur presented as in the subject of this sketch. In fact, one may search the world over without finding a more unique or a more impressive example of nature's work than this lonely column of Wyoming.

THE MOST PRIMITIVE OF NORTHERN PRIMITIVE RACES.

MR. A. H. SAVAGE LANDOR, a gandson of Walter Savage Landor, has recently incorporated in an interesting volume, "Alone with the Hairy Ainu," the observations of a traveling artist in the island of Yezo, Japan, who accomplished some 3800 miles on a pack saddle, and lived for five months almost exclusively among the peculiar people who have so long attracted the attention of ethnologists. Few white persons have enjoyed better advantages toward the study of these people, and the observations which Mr. Landor records are exceedingly novel and instructive, differing in many particulars from the observations that have been made by previous travelers. We abstract a few paragraphs from a clear condensation of the work which appeared in a recent number of *Nature*:

"Mr. Landor shows, by a series of detailed contrasts, that the pure Ainu has no similarity whatever to the Mongolian type. The color of the skin he found to be light reddish-brown. The eye is particularly contrasted to the Mongolian eye, having a similar form and setting to that of North Europeans, while the iris is light brown or dark gray—rarely black or dark brown, except in the case of half-breeds. . . . Mr. Landor never saw the pure Ainu laugh, though on one occasion he induced a man to 'roar' with surprise and delight. The various emotions are expressed by slight changes of posture or gesture, but the Ainu do not care to show their feelings, they have no sense of shame, and even fear appears hardly to be known.

"The women do most of the hard work, but the men when hunting can walk forty miles a day without fatigue, although usually they prefer to ride, ponies being plentiful and of a good breed. In moving a load or heavy object the Ainu never push, but always pull towards them. They appear to use the toes and feet very freely to help their hands and fingers, and they readily employ their teeth, preferring to pull with the teeth than the hand when an unusually heavy haul is necessary. The whole appearance struck Mr. Landor as exactly like the reconstructions of the primitive man of Northern Europe, and many of their movements recalled those of the anthropoid apes.

"In sexual matters the Ainu appear to have no definite rules, but a form of endogamy is common, which scarcely differs from promiscuity. The people are extremely filthy, both in their persons and in their huts, the prevalence of insect parasites being remarkable. They seem to have an acute sense of smell, distinguishing between the odor of an Englishman and a Japanese, but oblivious to their own very marked perfume—an intensified form of the 'peculiar odor of an uncleaned monkey's cage.' The sense of touch is singularly defective, and even when the extremes are painful, they cannot distinguish the sensation of heat from that of cold. The hearing is very acute.

"Mr. Landor is severe on those writers whose imperfect acquaintance with the Japanese half-castes on the southern coast has led them to theorize on Ainu religion. He acknowledges only 'a rudimentary kind of totemism' in connection with the bear festivals, and 'a certain amount of fear and respect for any thing that supports their life or can destroy it !'

"In every respect the new observations now published make the Ainu appear to be the most primitive of primitive races in the northern hemisphere."

[Much has been written about the Ainu, but the observations of travelers differ so widely among themselves that it seems difficult to arrive at a just conclusion regarding these interesting people.]

THE WINTER TEMPERATURE OF NEW YORK AND FLORIDA CONTRASTED.

MR. FREDERICK G. BRILL, of New York, a winter resident of De Land, Florida, sends to us an instructive tabulation of comparative thermometric readings made during the past winter at localities removed from one another by only thirty-three hours' railroad distance. The following thermometric maxima and minima (or highest and lowest readings) for the month of February are very suggestive :

MAXIMA.

		New York.	De Land.	Jacksonville.
Feb.	4	33°	80°	70°
"	5	25°	57°	48°
"	9	39°	80°	77°
"	12	29°	82°	74°
"	13	22°	77°	71°
"	14	29°	83°	79°
"	15	37°	66°	55°
"	18	49°	77°	66°
"	19	42°	81°	73°
"	21	41°	81°	75°
"	22	37°	83°	73°
"	23	29°	78°	62°
"	24	11°	68°	55°
"	25	21°	75°	64°
"	26	33°	61°	52°
"	28	47°	72°	64°

It will be observed that the maxima on five days of the month (February 12, 13, 14, 24, 25), was to the advantage of De Land by full 50 degrees !

The minima readings show equally surprising results :

MINIMA.

		New York.	De Land.
Feb.	4	24°	63°
"	5	7°	38°
"	10	34°	64°
"	12	22°	64°
"	13	18°	58°
"	14	16°	61°
"	22	23°	64°
"	23	18°	60°
"	24	4°	62°
"	25	1°	55°

On two days, February 24, 25, the advantage was in favor of De Land by again 50 degrees—indeed, on the 24th, by 58 degrees ! The highest and lowest temperatures for the months of December, January, and February, together with the mean for these three months, are as follows :

	Highest.		Lowest.		Mean.	
	New York	De Land	New York	De Land	New York	De Land
December	58°	79°	13°	29°	35°.1	60°
January	58°	79°	17°	30°	34°.5	60°.9
February	52°	83°	1°	35°	29°.6	62°.7

WHAT TO DO IN JAPAN.

HARRIET J. BAIRD—HUEY.

TO intending tourists I would urge the advisability of going at the earliest possible date, as Japan, attractive and picturesque as it is, is rapidly losing a great part of its charm to western eyes through the adoption of foreign fashions. I fear, indeed, that even the jinrikisha will soon become a thing of the past, as Mr. Takaki informs me that with the opening of the Exposition at Kyoto, in 1895, electric cars will be running to all parts of that city. He spoke of it as a great advance, to me it seemed a deplorable innovation. The best time to sail is about the first of September, reaching Japan about the middle of the month, when the typhoon season is practically over. A passport must be secured before leaving America, and on landing at Yokohama your first employment, after getting through the customhouse, and engaging quarters at a hotel, is to present this American passport to the United States Consul, in order to procure a Japanese one, as a foreigner, without this very important document, can travel only between Yokohama and Tokyo.

Now comes the selection of a guide, and I am glad to call attention to a new order of interpreters, who speak English fluently, are well versed in the history of the country, and are superior in every way to the ordinary licensed guide of Japan—I refer to the students from the colleges of Tokyo. You need lose no time while waiting for your passport, as Tokyo is distant only an hour's ride by rail, and there the palace, residences of the diplomatic corps, gardens, markets and shops, added to the temples of Uyeno, Shiba and Asakusa, would take many days to see thoroughly.

Three requests should be made of the American Minister: 1. An invitation to the ball given by the Premier on the Emperor's birthday, November 3d; 2. An invitation to the Emperor's chrysanthemum fête at Akasaka Palace, on November 10th; 3. Permission to visit the imperial palace at Kyoto, the residence of successive mikados during the years the Tokugawa Shoguns usurped the powers of the rightful sovereigns. These requests our Minister presents to the proper cabinet officers, and in due time the coveted bits of pasteboard are forwarded to good Americans. At the legation also can be secured cards of admission to several gardens in Tokyo belonging to the Emperor.

Your passport obtained, beautiful Miyanoshita and the far-famed hot springs of Hakone demand your attention, and, if you are a mountaineer, Fujiama, the peerless, challenges you to climb to its summit. Kamakura, with its wonderful colossal statue of Buddha, and its temple of Hachiman; Enoshima, with its cave, sacred to Benten, the Japanese Venus, its winding walks, delicious fish and divers—photographs always represent these divers to be beautiful young girls, but, by some strange process of transmutation, one sees only ugly old men—and Yokohama itself, with its delightful foreign colony, its Honcho-dori and Benten-dori, paradise for shoppers, its theatre street, with all manner of amusements, and the tea house of One Hundred and One Steps, where Mrs. Tanabe proudly exhibits her collection of foreign autographs, have all been visited and enjoyed, when on a fine October morning you take the train for an overland journey from Yokohama to Kobe.

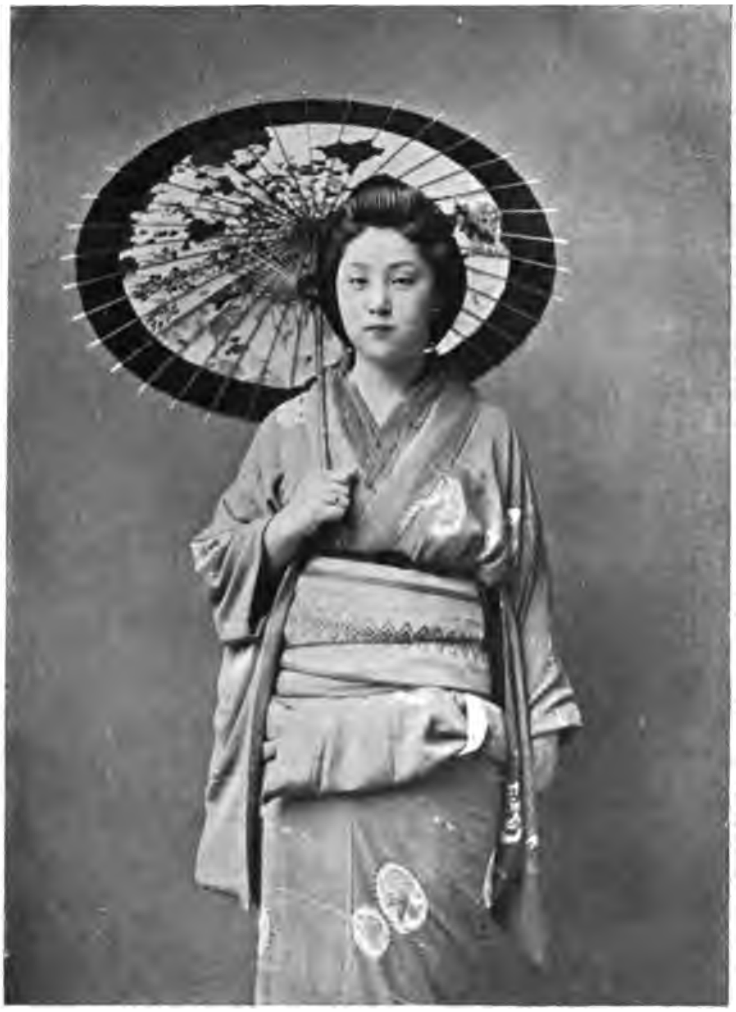
The first day's ride is through a mountain cañon of great beauty—the foliage just tinged with the tints of autumn—to Gotemba, thence to Shidzuoka, where the night is spent. and early the next day you reach Nagoya, with its curio shops and cloisonnée workers, and the great castle where the golden dolphins are proudly raised aloft. These dolphins are eight feet high, and are said to be worth $100,000 each. Why some impecunious mikado has not long ago melted them down and put gilded wooden ones in their place is not very clear to the Occidental mind, and I fear the query, "Are you sure they are gold?" occurs to every foreign visitor.

The next day's journey is through tea-gardens and bamboo groves to Kyoto—the fascinating. As much time as possible should be given to this city, for here the workers in Damascene ware and rare porcelains, the carvers of wood and ivory, the weavers of brocade and crêpe are found—here, too, are the famous embroiderers, Nishimura, Takashimaya and Tanaka, and that past-master of the art of cloisonnée, Namikawa, of Kyoto, the one artist in Japan who has never degraded his art by pandering to the cheap, foreign export trade. Fine temples abound, the most beautiful being the Nishi-Honganji and Higashi-Honganji, at the latter of which you will be shown the rope, of great strength and elasticity, made from the hair of the people of a whole province, which was woven to draw from the water one of the immense timbers of Keyaki wood used in building the temple.

The dancing girls of Kyoto are the best in Japan and a supper with music and dancing must certainly be enjoyed, and the evenings in Theatre Street will be full of interest and amusement. The Japanese never seem to need much sleep and turn night into day with the greatest facility.

Two excursions should be made from Kyoto: one, running the rapids of the Dayugawa through a cañon that our own State of Colorado might envy—the other to Lake Biwa to see the famous fir-tree of Karasaki, said to be 2000 years old, a notable example of how little chance a poor tree has to grow naturally when opposed to the patience, perseverance and, in this, as in many other instances, misdirected energy of the Japanese gardeners. In odd moments the pawn-shops of Uno and Nomura will tempt you to find the grain of wheat in the pile of chaff, and at last, feeling that the wrench must come, you start for Kobe, where you make arrangements for the steamer passage through the Inland Sea.

Nara, where you leave far behind the hurry and hustle of the nineteenth century, amid the quiet of the great temple park, where the deer have yet to learn that man is their natural enemy; Arima, the little mountain village, where every man, woman and child is a basket-maker; Osaka, the



JAPANESE LADY OF RANK.

Venice of Japan, with its canals and bridges, its shops and bazar (the best in the country), its extremely fine theatre street, its castle, the enormous stones in the wall surrounding it—the despair and admiration of modern engineers—all these places are within easy distance of Kobe. Here, too. the Japanese town of Hiogo and the foreign one of Kobe—so near together, yet so very, very far apart—the Moon Temple, high up the mountain ; the great Buddha in process of erection, growing now fast, now slow, as the women are zealous or indifferent in bestowing their metal hand-mirrors, and the two pretty waterfalls, which make a pleasant morning's excursion, fill up every moment of the time until the day when the steamer sails for Nagasaki.

The voyage through the Inland Sea, which in many places reminds you of the Thousand Isles of the St. Lawrence, is one unbroken delight—you actually begrudge the time given to sleeping and eating, and are heartily sorry when Nagasaki, the scene of Pierre Loti's "Madame Chrysanthême," is reached. In the beautiful harbor is pointed out the Cliff Pappenberg, from which thousands of the converts to the labors of the Jesuit priests were driven into the sea three hundred years ago. The flags of many nations are flying from the vessels, for Nagasaki is the great coaling-station for this part of the Pacific.

Returning for the Emperor's birthday ball to Yokohama, you feel quite like an old resident as you register at the Grand Hotel. The ball in honor of the Emperor shows you that Young Japan, among the nobility and in the diplomatic circles, is very much like Young Europe or Young America, and, as your Minister points out the eminent men of the Japanese empire, you try to realize the tremendous political changes, the bloodless revolutions in her government which have marked her history during the thirty years since the overthrow of the Shogunate.

Nikko, the city of temples, lying like a jewel among its surrounding mountains, you have left for the last for two reasons—first, that all else you have seen has led you up to it, and secondly, that the Japanese maples may be seen in all the glorious beauty of their autumnal foliage, the frost king giving them a brilliancy of color that even our own sugar maples cannot attain unto.

Formerly the traveler took jinrikishas and went along the Holy Way of the pilgrims to Nikko, but the pilgrims have either grown fewer or more luxurious, and now the railroad takes you swiftly on your way.

The temples of Nikko, which are the finest specimens of expert wood carving in the world—the embodiment of the thoughts, the philosophy, the religion, the mental attitude of Japan—were built, as were the cathedrals of Europe, for love of the beautiful ; a great master of the English tongue has declared himself incapable of describing them—before them you stand in admiring silence. But, as even grandeur will pall on one, it is perhaps a pleasant change to take a charming trip through the mountains, all aglow with their scarlet autumn livery, past the waterfall of Kegon-no-taki, with its sheer leap of 300 feet to Lake Chiuzenji, passing the night at one of the tea-houses there, and then on to Lake Yumoto and the village of the same name, with its hot springs and bath-houses built to command magnificent views (a combination of sentiment and utility possible nowhere but in Japan) ; and, if you are a mountaineer, a longing desire will carry you to the top of Nantaizan, standing like a giant of the Sierras, lonely and cloud-crowned. There are three ways of making this trip : 1. To walk ; 2. To take one of the rough, little Japanese ponies ; 3. To use an arm-chair, lashed between two bamboo poles and carried by four coolies. If the latter method is adopted your verdict will be up-hill, very comfortable ; down-hill, quite tolerable ; on the level road, get out and walk.

Back to Tokyo for the Emperor's chrysanthemum fête, where you will figure as a distinguished foreign traveler—no foreign resident in Japan ever being invited to it—and where your Minister will present you to their Imperial Majesties, and the royal autumn flower will be seen in the land of its birth and in its full perfection. Then to Yokohama, and now the packing of trunks, the arranging of curios for transportation, last visits to the makers of lacquer and porcelain, farewells to friends, trips to Tokyo to see the famous actor Danjiro, the wrestlers, and the unique chrysanthemum show of the florists in the Dango-zanka suburb of Tokyo, evenings spent in theatre street at the exhibitions of the conjurers and sleight-of-hand performers—every day, every hour is full, but amid all the pleasure, the hurry and confusion, sailing-day does come, Fuji's snow-crown is seen for the last time, "Sayonara" must be said, and the Land of the Rising Sun is for all time a pleasant memory.

MAN'S PLACE IN NATURE AND HIS ANTIQUITY UPON THE AMERICAN CONTINENT.

THE EDITOR.

SOMEWHAT over thirty years ago Professor Huxley, then a scientist who was still looking forward to the period of middle manhood, gave to the world a remarkable work entitled "Man's Place in Nature," in which he attempted to locate the proper position of the human subject in the organic chain. Darwin's "Origin of Species" was then but a few years old, and about it was waged that billowy contest which for still a decade or more was destined to break upon the scientific shores, and keep from them that peaceful calm, the coming of which had been presaged in the "History of Civilization." With that close reasoning which has ever been a distinguishing quality of Huxley's mind, and the support of facts which could not well be disputed, the young naturalist boldly proclaimed that, so far as anatomical considerations were concerned, man followed closely upon the higher apes and with them constituted a single animal group. No special pleading could separate the human skeleton from the skeleton of the gorilla, the chimpanzee, or the orang by a broader gap than that which separates the skeletons of these animals from their nearest congeners, the monkeys—nor, indeed, could it be separated so far. Zoologically, therefore, man and the monkeys were a unit.

It was not contended that a broad hiatus did not separate him from his nearest allies. The special intellectual quality which distinguishes man could not be overlooked, but as a factor in classification it had little value, since the quality, even in man, is an ever varying one, and does not permit of estimation in the case of other animals. In the thirty years that have followed the publication of Huxley's work no new facts that have been made accessible in any way diminish the force of his argument, which to-day stands practically unchallenged in the scientific world. Little progress has, however, been made in the direction of determining who or what were the immediate ancestors of man—what were the forms which bound him still more firmly to the types which to-day stand nearest to him in structure. It must be admitted that, so far as positive evidence is concerned, no true missing links have as yet been discovered. Every truly "hominine" skeleton that has been discovered is with reasonable probability the skeleton of man; the oldest fashioned implements that have been unearthed from river and cavern deposits are with little doubt the product of human artifice, for as yet the evidence is exceedingly slender for assuming some of these to have been the making of prehistoric apes or of connecting forms between man and apes.

Man while man is, however, a very varying organism, and just as among the living species there are those who represent a lower or ruder grade of organization than others, so among the few skeletal remains that have been unearthed we find indications of a structural type that departs still more widely from the form which might be assumed to be representative of the genus homo. Two years before the publication of Darwin's "Origin of Species," in 1857, the discovery of what has since become famous as the "Neanderthal skull" attracted the attention of naturalists to a form of human cranium which had broadly marked simian characteristics. Like many first discoveries, however, it unfortunately for a long time stood alone; the narrow conformation, rapidly retreating forehead, and proudly rising orbital ridges were to many not the indices of a comparatively low and ape-like organization, but a mere "sport" or accidental deformation. Nearly thirty years of doubt covered this lonely indication of man's lowly type, when, in 1886, MM. Fraipont and Lohest discovered, in the commune of Spy, Belgium, two nearly complete skeletons, which so far retained the cranial features of the Neanderthal man as to leave little room for further doubt, except in the most conservative minds, as to the normality of the characters which were presented in the first find. The skeleton, as well as the skull, had "reminders" of the anthropoid ape in it. A structurally primitive man had been found. But how primitive?

It can be accepted almost without hesitation that man is descended of an ape-like organism, and, indirectly, of the higher ape itself. The fact that no remains of a connecting link have yet been discovered carries no weight in the premises, any more than the circumstance that so few of the skeletal parts have been found argues against the antiquity which the numerous fashioned implements indisputably prove. That such a form will eventually be discovered is easily possible, although naturalists are by no means agreed as to the locality where exploration is most likely to yield positive results. While the conclusion is by no means startling, it is as yet hardly safe to go with Professor Cope and assume that some of us may be "the direct descendants of the *Homo Neanderthalensis*," although it probably is true, as stated by this naturalist, that in the type represented by this fossil we have "a greater number of simian characteristics than exist in any of the known races of the *Homo sapiens.*"

In Europe man's antiquity is unquestionably carried back to the period of the great ice age, and almost without doubt he was a factor in existence ages before that period. What this means in years no geologist can say ; some may prefer a few thousand years and others tens of thousands, or even a hundred thousand years, but with either assumption the facts in the case are wanting. Many ingenious calculations, based upon the modification and wear and tear of the land-surface, have been advanced tending to prove a comparatively recent date for the passing of the ice, but the facts as they are presented are not of such a nature as to entitle them to a full share of confidence, if, indeed, they are entitled to any confidence whatever. The subject is one which is presented with several sides, and until these different sides converge to a common or approximate result, the final verdict must be withheld.

On the American continent yet more uncertainty exists regarding the coming of man than in the case of the man of Europe. The few parts of evidence that have so far been discovered—the skull of Lagoa Santa, of Brazil, the Calaveras skull of the gold-bearing gravels of Table Mountain, California, the Florida man, and the various chipped implements which have been found scattered over the United States, from the Atlantic border to Minnesota and beyond, and to which a doubtfully palæolithic age has been assigned—are of such a character as to inspire little faith in the surmises that have been built upon them. They may or may not be representative of the true "old stone age" of Europe (palæolithic), they may or may not be contemporaneous with the coming or the going of the ice, or they may or may not be belongings of a comparatively modern period of time—this is as far as the evidence of to-day will permit us to go. That man in this country, as well as in Europe, was a contemporary of some of the large animals, now no longer living, which at one time roamed over the length and breadth of the continent, may be assumed without question, and that he was a witness to the visitation of the ice is almost equally certain. But the direct evidence on this latter point is wanting. For many years the implements (so-called) of the "glacial gravels" of the Delaware River, at Trenton, N. J., were considered to be unimpeachable evidence of man's contemporaneity with the ice ; but darkening doubts have gradually been gathering over these Trenton "finds," and to-day there are probably not many among either geologists or ethnologists, except such as may be personally interested in the discoveries, who would feel disposed to erect a mausoleum over these relics of the departed, and still less to build a theory upon their supposed teachings. With the fate of the Trenton implements still hanging in the balance, one may well be justified in being skeptical regarding the value and authenticity of certain other finds which have been enthusiastically heralded as proofs of man's great antiquity on the continent. But even if proof of such antiquity is not forthcoming, the antiquity itself is thereby not necessarily destroyed.

A GLIMPSE OF THE BARBARY COAST.—TANGIER AND ALGIERS.

It is probably not too much to say that in Dr. Field's publication, "The Barbary Coast," we have one of the most delightful books of travel that have appeared during the past twelvemonth.* Like Mrs. Peary's "My Arctic Journal," it is a work of vivid reality, transporting the reader bodily, if one might use the expression, to the scene of action of the author. Mr. Field is no explorer, and he makes no pretense to being a member of that upper guild of the world's benefactors ; he is merely an every-day tourist-traveler, but one who is specially gifted with eyes to see and with an unusual faculty to describe what is seen. Whether it is the distant view of mountains, the solitude of the desert, or the dirty Arab children, with the picturesque corners around which their rickety quarters are established, that engages the pen of our author, he is equally happy with them all, and over all he diffuses that warm sunlight which is born of the African soil itself. The following description of the city of Tangier well illustrates the manner of the book :

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* "The Barbary Coast." By Henry M. Field —New York : Charles Scribner's Sons, 1893.

"In passing through the gates into the city, we have another surprise in finding no carriage to take us to a hotel. But if any prince or potentate were to enter under this archway, expecting to make a royal progress through the streets, he would be disappointed, for there is not even a baby carriage in all Tangier, nor a wheeled vehicle of any kind. There are no broad highways for chariots, while some of the by-ways are too narrow for a dog-cart. Wherever you go you must take your chance in the streets with horses and donkeys and camels. A loaded camel that comes swinging along will soon clear a passage ; at least, it is prudent to get out of the way. The more common beasts of burden are the little donkeys, with panniers on their backs ; and a donkey always has the right of way. Americans will observe the beautiful democracy of this Moorish city, in which not only are all *men* free and equal, but all men ***and beasts*** are on a level of perfect equality. A donkey may not be a voter, but he has the freedom of the city by right of his heels. He is as free and independent as any of our newly-imported citizens. He is no respecter of persons, and would kick a prince as soon as a beggar.

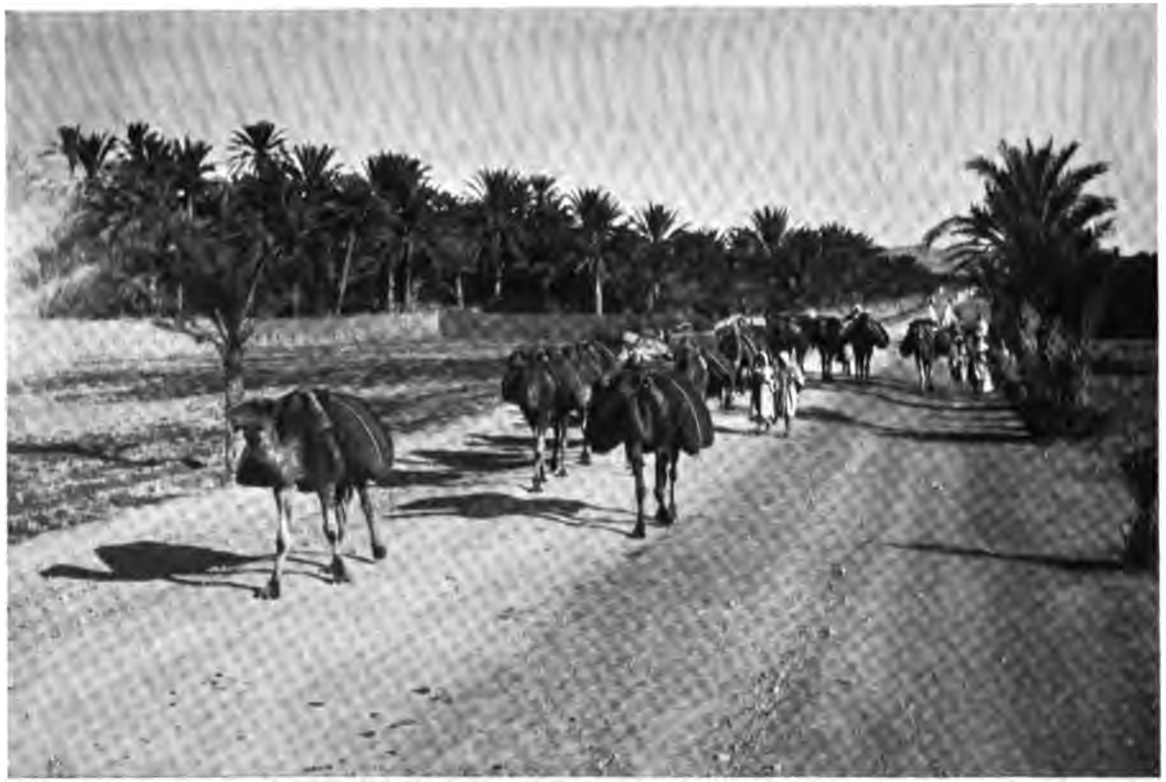
"All this would be amusing if the streets were not so abominably filthy. Artists may think that dirt is always picturesque, as in the 'Spanish Beggars' of Murillo. But this is not picturesque ; it is simply dirt. The pavements are mere cobblestones stuck in the mud, with hardly an attempt to make a smooth surface. It is not an extreme presumption that the stones lie as they were placed by the hands of the Moors when they were driven out of Spain, and on these stones are dumped all sorts of rubbish, till it seems as if only a tidal wave breaking over these shores could wash the city clean. And so we get a double impression of quaint old Tangier, as we view it from without or from within. It is a city of contrasts and contradictions, that answers to the fable of 'Beauty and the Beast.' On the outside it is one of the most beautiful of cities ; within it is the vilest ; and the transition from one to the other gives me such a shock that I am almost tempted to say that the shining walls which glitter in the sun are but a whited sepulchre, full of dead men's bones and all uncleanness."

In marked contrast to this picture of the Moorish city is that of the now much-frequented Algerine capital :

"This African journey is full of surprises in the sharp contrasts which give to each new place a *couleur locale* quite unlike that of its predecessor. One cannot imagine a greater change than that from Tangier to Algiers. They have hardly anything in common, except that they are both in Africa and both on the Mediterranean. But Algiers is a European city, while Tangier is distinctly African. And yet Tangier is much nearer Europe ; indeed, it is in sight of it. From my windows I could look across to the shores of Spain. But for all that, I felt that I was out of the world. But here, though it is 500 miles across the sea, we are in close touch with France and with all Europe. Every afternoon, at 3 o'clock, the steamer which left Marseilles the day before at noon, rounds into the bay ; while the submarine telegraph reports the doings of the Chamber of Deputies, which appear in the morning papers as regularly, if not as fully, as in those of Paris itself.

"As Algiers, or the French part of it, is the offspring of Paris, it is a true son of its father, whom it copies in all respects, in its very architecture, as in its way of life. More than one long colonnade is an exact reproduction of the Rue de Rivoli ; the shops and restaurants and *cafés* are almost as gay as those on the banks of the Seine ; and as one sees the great number of people sitting round the tables, sipping their coffee, and talking as only Frenchmen can talk, he might easily imagine himself on the Boulevards.

"But the beauty of Algiers is not in its likeness to Paris, but rather in its difference from it, by reason of its latitude, which gives it another climate, so that in two days one passes from bleak winter to a land where the seasons are rolled backward—or forward—giving perpetual spring. The charm is not in the city itself, but in its atmosphere, in the balmy air, in the palms and the flowers that bloom in midwinter ; and in its surroundings, the encircling hills, crested with villas, from whose broad verandas look out, not eastern houris, but noble English and American women, who, in this land of the sun, gather in their interiors all the attractions of their distant homes.



CARAVAN LEAVING BISKRA.

(From Field's "The Barbary Coast.")

"With such a climate it is not strange that the English in great numbers leave their island, wrapt in fog and mist, and seek a winter home on the southern shores of the Mediterranean. I meet them everywhere—in the hotels, in the streets, and on all the country roads, driving or riding on horseback, while in the suburb of Mustapha Supérieur the residences are largely those of the English colony."

Mr. Field's line of travel takes in the Barbary Coast from Tangier to the site of old Carthage, of which city nothing now "remains standing. . . . . . not only are there no temples like the Parthenon, and no palaces like that of the Cæsars, but not even a broken arch or column to mark the place where it stood." To those who do not habitually associate Africa with a region of high elevations it will be interesting to learn that some of the mountain tracts of the north are considered to equal in grandeur of scenery Switzerland itself. In describing the gorge of Chabet, in Algeria, Mr. Field says: "I can only say that I have seen nothing grander in the Alps. Indeed, the nearest parallel to it is in our own country, in the Black Cañon of the Gunnison in the Rocky Mountains." The book is attractively, although not profusely, illustrated, and it could well afford, if only for the advantage of the intending tourist, to have a better map.

NOTES ON MOUNTAINS AND MOUNTAINEERING.

THE ASCENT OF EL MISTI.—In the March issue of *Appalachia*, the official organ of the Appalachian Mountain Club of New England, Prof. W. H. Pickering, of the Harvard Observatory, gives an interesting account of his ascent of El Misti, 19,200 feet elevation, one of the high summits which overlook the basin of Titicaca, in Peru (and Bolivia). No special difficulty, beyond that resulting from the rarefied atmosphere, was encountered in the ascent, although two of Professor Pickering's associates found it impossible to reach the summit. A night's camp was established at an elevation of 18,440 feet, whence the rim of the crater was reached early next morning in about twenty minutes. Professor Pickering says that when he reached the summit he was "glad to lie flat on my back for ten minutes to recover myself." The pulse, while very faint, registered 100, as against 68 at Arequipa, and the breathing 25 (14 at Arequipa). A double crater occupies the summit of the volcano, the crater of activity being nearly circular, with a depth of several hundred feet and a diameter of possibly a third of a mile. Professor Pickering, referring to his descent, says: "If the mountain was hard to climb, it was certainly one of the easiest of descent that I have ever known. The motion was almost like skating, the loose stones rattling and sliding after one, and the finer particles following in a cloud of dust. Each step was between one and two yards in length, and I reached the base of the cone from the edge of the crater inside of fifty minutes. The *tambo* was reached half an hour later, and I had descended over 5000 feet inside of one hour." This is an extraordinarily rapid descent, but travelers who have "experienced" the loose sands of volcanic cones, such as Vesuvius or Popocatepetl, know the conditions which make rapid descents in such mountains possible.

Concerning the peculiar *mal de montagne*, about which there is so much diversity of opinion, Professor Pickering writes as follows: "As the subject of mountain sickness seems to be attracting much attention at the present time, some further results of our experience in this region may be found interesting. In 1892 we established a camp upon Mt. Chachani, at an altitude of 16,600 feet. Here we had a stone hut built with a bridle-path leading to it. Many persons visited this camp in company with myself or my assistants, and thus we had an opportunity to witness many phases of the complaint. The commonest symptom was a severe headache, with a disinclination to move about. This was sometimes accompanied by nausea, and in one instance by a temporary loss of memory. I remember a case which occurred upon Pike's Peak, where the victim became temporarily delirious; but this I think is very unusual. The sickness seems to be brought on by hard work, or by eating a hearty meal. At these altitudes one seldoms feels very hungry, and a dinner consisting of a little broth and some fruit is all that is needed, and seems to be all that one can digest. Meat should in general be avoided. It sometimes happened that a visitor would feel remarkably well on arriving at the camp, would walk around briskly, laugh at mountain sickness, perhaps smoke a cigarette, eat a hearty dinner, and inside of fifteen minutes would be stretched out flat on his back. Our experience was that if one felt uncommonly well and lively, this of itself was a symptom of the complaint. Recovery was sometimes rapid, but usually the case went from bad to worse, especially as night approached. The following morning the sufferers would usually feel better. We found that all persons with blood of the white races in their veins were subject to the complaint, the pure-blooded Indians only being more or less exempt. Half-breeds who had spent all their lives in Arequipa were often more susceptible to it than ourselves.

"In my own case this susceptibility rapidly wore off, and after my first night on the Misti I never again felt any very serious inconvenience. Shortly before my return to the United States I made an attempt to ascend Chachani; and had it not been for an accident to a member of our party, we should probably have succeeded in our attempt. As it was, I reached an altitude of about 19,000 feet without any premonitions of mountain sickness. One of my assistants, on the other hand, thought that the tendency to the complaint increased with the length of his stay in Arequipa. Although more or less like sea-sickness in its symptoms, immunity from the one by no means promises freedom from the other."

THE VIEW FROM THE MONT BLANC.—Herr Imfeld, who, after most determined efforts, has succeeded in making a complete panoramic representation of the view from the summit of the Mont Blanc, defines the limits of this view as follows: In the southeast the most distant point of vision rests on the Apennines, in the line connecting Genoa with Florence; southward, the eye rests upon Monte Viso and the Pelvoux group of mountains in Dauphiné; westward, it sweeps over the Cevennes, the Côte d'Or, and the Plateau of Langres (about 150 miles distant); and in the north, over the Vosges Mountains and the Black Forest. Seemingly, therefore, the furthest point of view is in the direction of Florence, but it is not clearly stated how much beyond Genoa the Apennines can be followed. Herr Imfeld decides that the ocean (in the Gulf of Genoa) is not visible from the Mont Blanc, although he believes it possible that under special conditions of atmospheric refraction the peak may be seen from the gulf.

WINTER ASCENTS OF ALPINE SUMMITS.—There is a tendency to degrade the exhilarating art or science of mountaineering to the rank of a show performance—the exhibition of *Bravourstücke*. Nine members of the Swiss Alpine Club, desirous of seeing the change of years from an exceedingly high altitude, made an ascent of the Monte Rosa (to the Capana Margherita) on the 31st of December last. Enveloped in a snow-storm, five of the party were obliged to pass the night in the open, when only a short distance below their objective point. Lieutenant Giani died of exhaustion and exposure. A similar fate appears to have overtaken the Viennese tourists, Dr. Ludwig Kohn, Dr. Sigmund Patzau and Robert Pick, who, without guide, made an attack upon the Grossglockner on Christmas Day. Another Viennese, Herr Deinzer, at the same time lost his life on the Raxalp, a mountain of no great elevation.

REVIEWS AND NOTES.

THE LAND OF POCO TIEMPO. By Charles F. Lummis.—New York: Charles Scribner's Sons, 1893.

In a few luminous and seemingly too-highly colored chapters the author of this attractive little volume portrays the characters and characteristics of New Mexico—the New Mexico of the Pueblo Indians—which he has happily designated the land of the "pretty soon." The greater part of the volume—indeed one might say nearly all of it—is taken up with the people, who are pictured with a vigor and breadth of touch which remind one of the bold sweeps of the impressionist artist, to whom no key of color is too high, and by whom no detail is considered necessary. Mr. Lummis is from the first page to the last a friend of the Pueblos, and he lauds them, if one might speak his words plainly, as the one people of the earth. Their perceptive powers are thought to be "still far ahead of the Caucasian," and not "physically, mentally, morally, socially, politically" need they shun comparison with the average of their "lately acquired countrymen." There is probably much of truth in these bold statements, and the traveler, aside from other and perhaps worthier reasons, will long to go to the region where are "children never spoiled, never disobedient, almost never quarrelsome; parents never neglectful and never harsh; and none who fail of respect to seniority—even as between boy and elder boy." Yet in this very land of sobriety Mr. Lummis was witness to one of the most gruesome scenes that it has ever been the lot of traveler to depict—the self-torturing, followed by a crucifixion, of the members of the Mexican order of the Hermanos Penitentes (Penitent Brothers). It is all but incredible that such performances should still (1891) take place upon the free soil of the United States, and our author, while one cannot enter into sympathy with his motives in so graphically describing the horror, nor join in the supreme delight with which, manifestly, he turned his camera upon the ghastly scene, deserves well for having made public probably the most revolting atrocity that still defiles the civilization of the nineteenth century. The Pueblos take no part in the practice.

Mr. Lummis is an uncompromising follower of Bandelier and his school of archæologists, and just as uncompromising an opponent of 'easy chair,' 'parlor' and 'Bureau' ethnologists. He accepts the year 1539 for the discovery of New Mexico (by the Franciscan fraile, Marcos of Nizza, *not* Cabeza de Vaca, who, it is asserted, never even saw the territory), and 1605 as the year of the foundation of Santa Fé (forty years subsequent to the foundation of St. Augustine, Fla.). The work is attractively illustrated and will doubtless be read with much pleasure by those who have been so fortunate as to visit what, from an ethnological standpoint, is unquestionably the most interesting portion of the United States.

A TIGUA GIRL.

From "The Land of Poco Tiempo."

THE CLIMATOLOGY AND PHYSICAL FEATURES OF MARYLAND. First Biennial Report of the Maryland State Weather Service. 1894.

In an attractive pamphlet of nearly one hundred and fifty pages Dr. Clark, of the Johns Hopkins University, the Director of the State Weather Service, gives a concise and lucid epitome of the physical features of Maryland, which is, in fact, the best epitome of the physical geography of the State that we possess. Every layman, whether he be a resident of a town or a tiller of the field, can read this work understandingly and with profit, which is more than can be said for many of the publications which emanate from the bureaus of official geological and agricultural surveys. The State of New Jersey, under the lead of its "farmer State Geologist" the late Professor Cook, has taken the initiative in giving to its inhabitants a solid, practical survey, one that is executed at moderate cost, and the results of which are presented in such form as to place them within reach of all who are taxed for the proper conduct of the survey. The topographical maps are a model of execution, and will challenge comparison with the best that are made anywhere; they, together with the reports which they accompany, should serve as models to other State surveys.

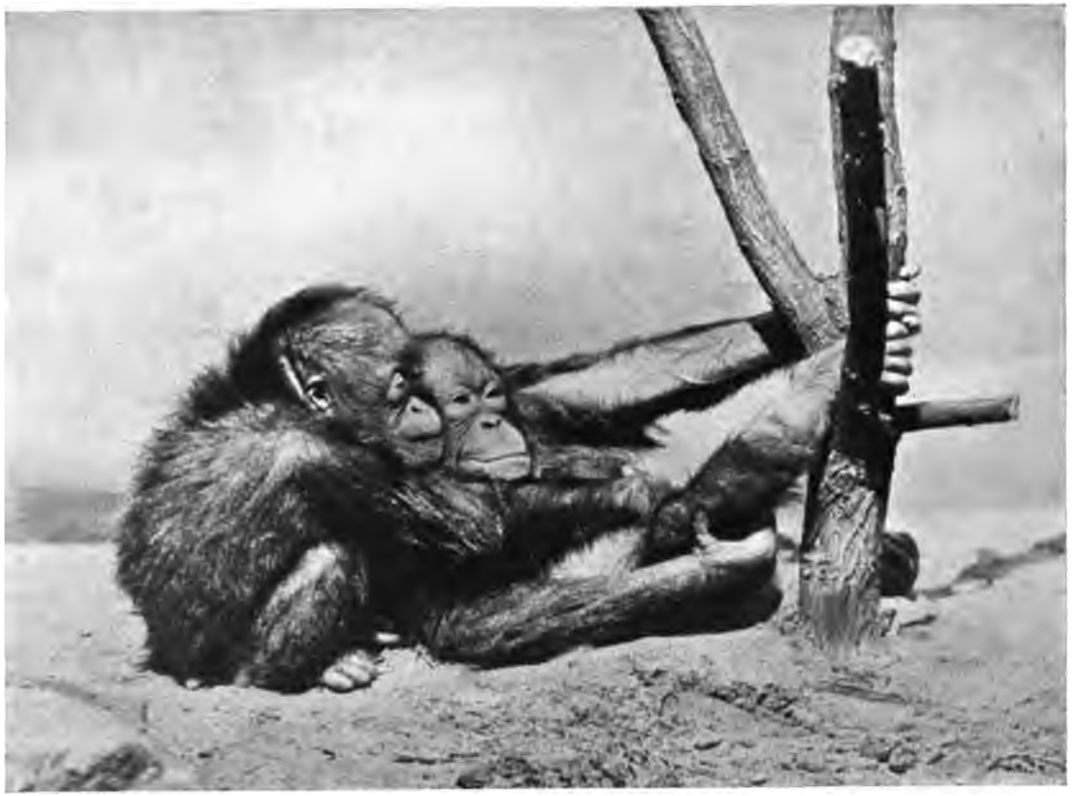
This first general publication of the Maryland State Weather Service, while not in the nature of a purely geological report, may, it is hoped, prove the forerunner of more extended reports of the New Jersey pattern, of which it is, in fact, to an extent a follower. The pamphlet deals with the topography, geology, soils, climate and crops of the State, and is accompanied by a number of maps illustrating temperature and precipitation. It is to be regretted that a geological map, even if only partially executed, has not been incorporated with the report. The mean annual temperature of the State is found to be 53°.8 F., the coldest month being January, with a mean temperature of 32°.8, and the warmest July, with a temperature of 75°.8. The annual precipitation over the State is approximately 42.5 inches, which is not unevenly distributed throughout the months, the extremes of precipitation being found in the months of July (4.78 inches) and December (2.69 inches). The month of January, 1893, "will long be remembered for its accompaniment of extremely cold weather." Seemingly "not since January, 1856, has there been experienced in Maryland, the District of Columbia, and Delaware, such a protracted period of severe weather." A minimum temperature of six degrees below zero was recorded at Washington on the 18th of the month, but at Baltimore (on the 16th) the thermometric registry, even with the extreme cold, was only one degree above zero.

HINTS TO TRAVELERS AND NOTES ON APPLIANCES OF TRAVEL.

A Cycloramic Camera.—Mr. Percy S. Marcellus, of Philadelphia, has invented a new film-camera which is certain to meet with favor with the more leisure element of the touristic community. Its object, as defined by the inventor, is to make a complete panorama of the scene surrounding the point from which the picture is taken. This is accomplished by a mechanism which causes the simultaneous movement of the camera and film; when the camera moves in one direction the film, while being carried along with and inside the camera, moves from one roller to another in the opposite direction, receiving the view or image as it is presented by the lens. The relation of the film to the lens is approximately the same as in cameras of a semicircular construction, having the film bent in conformity to their shape in the focus of the lens. It is claimed that not only will the camera make the whole or part of a circle, "but if required it could make two cycloramas at once or in succession, showing any changes of scene which might take place during its revolution."

Perhaps the most important use to which this camera can be put is that of surveying—or the work of field topography. That it has a function here cannot be doubted: in no other way, seemingly, can as accurate a determination of field positions be obtained as by the method of equal and simultaneous plotting, which reduces the possibilities of error to a minimum. To effect this, however, the instrument must be of perfect workmanship and constructed with true mathematical precision. The tourist and amateur will find in this camera, presupposing its full perfection, an almost endless adaptation to the varying scenes of city and country life.

The Hammock.—Of the many indispensable articles that help to make up the complete outfit of the all-round traveler—*i. e.*, of the traveler whose horizon is not limited to any one section of the earth's surface—few are more indispensable than the hammock. In many tropical regions it is the traveler's preferred bed, in some, as in Yucatan, it is almost his only bed, unless preference is given to the open roadway or to the stone flooring of the public "hostelry" which adjoins the residence of the *Jefe politico*. The luxury of a hammock swung from palm to palm, or from the branches of a noble forester beyond the reach of the discomforting creatures which are apt to invade the privacy of the traveler's quarters in all tropical regions, is too real to be readily effaced from the memories of a journey. Nearly all the true Mexican hammocks are of Yucatan manufacture, being skillfully netted by the natives, the Mayas, from the fibre of the sisal aloe (*Agave sisalensis*), a plant almost identical with the common "Century plant" of our gardens. The greater part of the industry of Yucatan is concentrated in the extraction of this fibre or hennequen, of which several million dollars'



AN ANTHROPOID COUSIN.—THE ORANG.

(Photographed from Life.)

worth are annually exported from the port of Progreso. The best hammocks are made in the hamlet of Tekantó, and the prices realized are far above what would perhaps be considered a true market value for articles of this class. The equivalent of from four to ten dollars is not infrequently paid for a first-grade article, and exceptionably even twice this amount is given. On the other hand, hammocks of an inferior quality can readily be purchased for the value of fifty cents. A light-weight hammock could advantageously form a part of the outfit of the traveler in almost any region; it occupies little space, and is sure to be a comfort under many circumstances.

Mexico in Summer Time.—The impression prevails that Mexico should be visited only in what is commonly known as the winter season and be avoided in the summer months. The reason for this belief is found in the notion that the summer heat of the tropics is excessive, and that malarial conditions are generated under its influence. Little or no account is taken of the matter of elevation or of the local conditions which govern each region. The elevation of the Mexican plateau is such as to make a summer journey to it not only safe but delightfully pleasant, the extreme of temperature being far below what it is in many of the more frequented resorts of the north. Indeed, it is only in the summer season, the season of almost daily rains, that Mexico is seen at its best, when the meadows and plains are aglow with green and flowers, when the ravines and gorges are musical with the streams that go tumbling through them, and when the sky has again become purified through the removal of its dust-clouds. It is then that the mountains loom up with a vivid intensity and their snows glisten with the brilliancy of polished steel. The City of Mexico, at an elevation of 7400 feet, has for its summer temperature the temperature of the opening days of our June.

An Aluminium Steamer for Service on the Niger.—A sectioned three-masted aluminium steamer, destined for hydrographic service on the river Niger, has recently been constructed in Paris, and is probably by this time in African waters. The total length of the vessel is somewhat over 42 feet, with a width slightly exceeding 9 feet. The displacement is 1 foot 4 inches for the full capacity of 11 tons. The total weight of the steamer, which is named the *Jules Davoust*, is 2200 kilograms, or about 5000 pounds.

NOTES.

THE Cost of Wild Animals.—The *Revue Scientifique* gives the following rates at which Hagenbeck furnishes the zoological gardens with their precious contents: Hippopotamus, 25,000 francs; Indian tapir, 2500 francs; lion, in good condition, 5000 francs; elephant, 6000–12,000 francs; tiger, 2500–4000 francs; leopard, 750 francs; black panther, 1000–1500 francs; jaguar 800–2500 francs; Polar bear, 1000 francs; brown bear, 150–250 francs; American black bear, 250–500 francs. There has been of late a general fall in the price of serpents, so that such which only a short time back commanded from 125 to 250 francs can now be purchased for 50 francs. The giraffe appears at this time to be the costliest of all animals, and the last one disposed of, within the last four years, brought 27,500 francs, or somewhat more than $5000. Less than thirty years ago Barnum claimed to have paid $25,000, or 130,000 francs, for a young hippopotamus, which was then a great rarity in menageries and zoological gardens. Hagenbeck's Hamburg depot is the great source of supply for the zoological gardens of the world, although both London and Amsterdam draw largely from their representatives in the British and Dutch possessions in India.

The Speed of Traveling in the Future.—The *London Geographical Journal* for February, 1894, contains an interesting abstract of an article recently published by E. de Keyser, in the Bulletin of the Antwerp Geographical Society, on the speed of travel that might possibly be attained in the near future. Reviewing the methods of travel in use so late as the end of the last century, when the fairly swift diligences made the traverse between Paris and Brussels in three or four days, and the modern performances of the locomotive and of the "ocean greyhounds"—M. de Keyser's citation of the fastest journey across the Atlantic is the record of the *Paris*, in five days and fourteen hours, a record which has since been lowered by both the *Lucania* and the *Campania*—he shows that at the present time, by combining in the most advantageous way the fastest runnings on the different lines which together make a circuit of the globe, a complete tour, *via* New York and San Francisco, might be projected for less than sixty-seven days, and *via* the Canadian Pacific Railroad in about sixty days. As traveling on the land is more expeditious than by water, it is naturally assumed that with the completion of the great trans-Siberian railway, which is now being rapidly pushed forward, and which may see its completion to Vladivostok within a period of ten years, a still greater reduction in time, of perhaps fifteen or twenty days, can be theoretically assumed. The circling of the globe would then be a matter of some forty days. And, finally, with the electric railways of the future, when a speed double that of the present express "flyers" can be counted upon (?), M. de Keyser sees no impossibility in reducing the time to twenty-four or twenty-five days. The work of the globe-trotter will then truly be a limited one!

ACROSS THE BARREN GROUNDS OF CANADA.—Mr. Tyrrell, who has recently published an account of his journey through the Barren Lands of Canada, from Lake Athabasca to the shores of Hudson Bay, claims to have traveled 850 miles through a country which, seemingly, had never been trod by human foot before. He describes the region traversed by him as "a rugged, rolling tract of land, speckled over with swamps and occasionally rocky hills. In the whole Barren Lands there is not wood enough to make a boot-peg." The animal life of the country is singularly deficient in certain directions, while it is most abundant in others. Scarcely a trace of a bird-fauna was visible, and of quadrupeds the "white" wolf and reindeer were apparently the only forms seen. Of the almost countless numbers of the latter Mr. Tyrrell writes: "Once we saw a herd that fairly hid the earth for a whole three miles, and at the smallest possible calculation there could not have been less than several hundred thousand feeding there on the damp grass."

THE FALKLAND ISLANDS.—Herr Gustav Schultz, who recently visited the Falkland Islands, gives some interesting data regarding that far-off land. The population, which in 1847 numbered 270 souls, had in 1887 increased to 1853, of which number 650 were residents of the chief town, Port Stanley. There are no trees on the islands, although they are not absent from Tierra del Fuego; ferns and mosses, on the other hand, grow in luxuriance. Perhaps the most distinctive form of vegetable growth is the tall tussock grass (*Dactylis cæspitosa*), which grows in great tufts seven to ten feet in height—the principal food of the native (introduced) sheep and cattle. The race of wild horses, which sprang from the French breed of 1764, has almost entirely disappeared, as have likewise the greater number of the "wild" cattle. Of the only quadruped indigenous to the islands, the Falkland Islands fox or wolf (*Canis Antarcticus*), no representative remains.

THE RECESSION OF NORMANDY AND THE MAKING OF THE JERSEY ISLANDS.—In an interesting work on the Bay of Mont Michel and its surroundings (*La Baie du Mont Michel et ses Approches*), M. Victor de Potiche shows that the bay is of comparatively recent origin, its position at the time of the Roman occupation being held by a forest-covered surface. The encroaches of the sea, probably furthered by a subsidence of the coast, were directly the making of the Channel Islands. No date is assigned to the separation or "making" of Guernsey and Sark, but Mont Saint Michel is credited to the third or fourth century of the Christian era, and Jersey to the period of the fifth or sixth century. Between the eighth and the fourteenth centuries the Island of Jersey appears to have lost fully one-third of its surface area.

DISCOVERY OF A MAP BY COLUMBUS.—Professor Wieser, of the University of Innsbruck, has recently made the interesting discovery, among the miscellaneous papers of the *Bibliotheca Strozziana*, in the National Library of Florence, of a number of hastily-drawn sketch-maps of Columbus, illustrating the fourth voyage of discovery of the great Admiral. They are inscribed on the margins of a letter dated from Jamaica, July 7, 1503, and illustrate Columbus's views regarding the relations of the new lands which he discovered. In their entirety they portray a complete equatorial belt of the globe, and clearly prove that Columbus remained steadfast in his belief that the continent which he had reached beyond the islands (the modern Central America from Honduras to Panama) was a part of great Asia, and he accordingly designates it as such ("Asia" and "Sinarum situs"—South China, with

Tonkin). He conceived that he had reached the realm of the great Khan, which had been made famous through Marco Polo's descriptions, and that the mighty Ganges could not be further removed than a few days' journey.

This map is seemingly the only one that is extant specially referring to Columbus's fourth voyage, and, according to Dr. Carl Peucker, the only one which dates back to the discoverer himself.

POLAR EXPLORATIONS.—The present year bids fair to be one of the busiest in all the long annals of Arctic exploration. Four expeditions, at least, will be in the field at one time: those of Mr. Peary, who, on the assumption that he is carrying out the program which he prepared before his departure last July, is at this time threading his way among the ice-fields to the northward of Greenland proper; of Nansen, whose course lies in the path of the northern "Siberian drift;" of Mr. Jackson, who proposes to follow poleward the line of Franz-Joseph Land; and of Mr. Walter Wellman, the latest aspirant to Arctic fame, who has chosen in a "dash for the farthest north" the much-neglected and seemingly most facile Spitzbergen route. Mr. Wellman's party will make an early landing on the northern extremity of Spitzbergen, and then take to the frozen sea, following the plan which had been so successfully adopted by Parry in 1827, but modified by the many new methods and appliances which the past three-quarters of a century have suggested. Coincidently with this work preparation is being made both in this country and in England toward the organization of independent Antarctic expeditions.

TROPICAL HEAT IN SIBERIA.—Baron Toll, who was commissioned by the Imperial Russian Academy to conduct an expedition to northern Siberia for the purpose of examining a reported (non-existent) mammoth find, and of making further explorations along the Arctic coast—secondarily to establish relays of dogs and provisions for Nansen and his associates—reports an extraordinarily high summer temperature for these northern regions. On the parallel of 72°—actually on the borders of the ice-sea between Bulun and Chatanga Bay—the thermometer was found to register, in July, 93° F. (34° C.)! Under the influence of such a "tropical" heat it is hardly to be wondered at that a truly luxuriant Arctic vegetation can be developed even in the course of a much shortened summer (or more properly speaking, growing) season.

GLACIATION OF ALASKA.—Dr. George M. Dawson, Assistant Director of the Geological Survey of Canada, in a recently published report on his reconnaissance of the Bering Sea region, thus sums up his investigations into the question of glacial physics: "One of the most remarkable features connecting with the Bering Sea region is the entire absence of any traces of a general glaciation. . . . Statements made by Mr. John Muir, in which he not only attributed every physical feature noted by him in Bering Sea to the action of glaciation, but even expressed the opinion that Bering Sea and Strait represented a hollow produced by glaciation, remain altogether unsupported. . . . No traces have been found of general glaciation by land ice in the region surrounding Bering Sea, while the absence of erratics above the actual sea-line show that it was never submerged for any length of time below ice-encumbered waters." The negative condition of northern Alaska as regards its occupancy by any portion of the ice of the great ice age is in full accord with the facts that are presented by northern Siberia, where, likewise, no evidences of a past period of glaciation have as yet been detected. These facts have an important bearing upon the question of the great ice age, since they prove, apart from other evidence, the non-existence in those parts of a great southwardly descending Polar ice-cap. A like negative result has been obtained by Captain Capalowicz, of Vienna, from his researches in Patagonia, where, contrary to the statements of Siemiradzki, no traces of a past glacial period could be detected.

INTERNATIONAL GEOGRAPHICAL CONGRESS.—The sixth International Geographical Congress will be held in London, under the patronage of her Majesty, Queen Victoria, in the early part of August, 1895. The Organizing Committee, of which Mr. Leonard Darwin is chairman, "cordially invite all who take an interest in any of the various aspects of geography to attend the congress, and to assist in making it a scientific success." It is requested that the subjects submitted for consideration should be of wide importance and of permanent interest. In their present grouping they touch the following departments of geography: 1. Mathematical Geography, including Geodesy; 2. Physical Geography (oceanography, climatology, geographical distribution); 3. Cartography and topography; 4. Exploration; 5. Descriptive Geography and orthography of place-names; 6. History of Geography; 7. Applied Geography, with special reference to history, commerce, colonization, etc.; 8. Education. It is expected that problems dealing with colonization will receive detailed consideration.

The subscription rate of membership in the congress is £1, or 25 francs; the wives and daughters (one is tempted to ask, Why not also the sons?) of members receive nearly all the privileges of full membership on the payment of half of this amount. All communications of inquiry, or otherwise, should be addressed to: The Secretary, International Geographical Con gress, 1 Savile Row, London, W. The first of these important congresses was held in Antwerp, in 1871, and was followed by those of Paris, 1875, Venice, 1881, Paris, 1889, and Berne, 1891.

GEOGRAPHY AND ARMY ENTRANCE EXAMINATIONS.—Mr. Baptiste Scoones, in a recent number of the *Nineteenth Century*, exposes the lamentably low position which is given to geography in the British army examinations. "The old preliminary examination in this subject unmasked a state of ignorance that was appalling. Its inconvenience as part of any established curriculum of study appears to be such that it has now been considered expedient to relegate it to the *optional* subjects, with marks sufficiently immaterial to discourage candidates from bothering their heads much about it. In the interests of our officers of the future this is scandalous. To no other subject is greater attention paid in examinations for officers of the French or German army. In France it is placed on exactly the same marks-level as history, and only a trifle below mathematics; while in regard to a modern language it stands as fourteen to ten. . . . When it is remembered that twenty-three years ago English correspondents at the Franco-German War reported that every German commissioned and non-commissioned officer carried a map of France in his wallet and was quite at home in the topography of the invaded districts, it is high time to call to account those who have encouraged this blameworthy supineness of ours. . . . Thus far it [geography] seems to have been kept outside the pale of 'education,' and has been treated as a subject *pour rire*. At school it has never occupied a position even approximating to that which at the universities certain personages call 'stinks': and yet it would be difficult to mention any subject more likely to be of general utility to a soldier, provided the present humdrum, childish smattering could be made to blossom, as it must do, into a minute and interesting appreciation of all its political, physical and scientific aspects."

COMMANDER VERNEY LOVETT CAMERON.—This distinguished officer, whose death, resulting from a throw from his horse, was announced as having taken place a month ago, is justly entitled to a first position in the ranks of African explorers. To him is due the demonstration that the Tanganyika system of waters drains westward into the Congo, instead of into the Nile basin, as had been assumed (although subsequently questioned) by Livingstone and other investigators of the Central African lake region. The main object of Cameron's African journey was the rendering of assistance to Dr. Livingstone, news of whose untimely death was brought to him by messenger, while on his march into the interior, on October 20, 1873. With an iron determination, not unlike that of his master in African exploration, the late Sir Francis Burton, Cameron pursued his journey westward, resolved to cross the continent at all hazards. Unable, through the resistance of the slave-raiders, to pass beyond Nyangwe, on the Lualaba—whence he had hoped to make the passage of the Congo, which has since been so successfully accomplished by Stanley—he directed his route southwestward in the direction of Benguela, emerging at Katombéla in November, 1875. Here he was toasted "to the honor of the first European who had ever succeeded in crossing tropical Africa from east to west." The observations made in the course of this remarkable journey are recorded in a singularly unpretentious work, "Across Africa." The accident which brought about Cameron's death was similar in kind to one to which the able commander nearly succumbed during his travels—a throw from his donkey. The incident is thus described by the actor: "I pitched exactly on the small of my back upon a pointed block of granite, and was so shaken and hurt that I was unable to walk even the few hundred yards to the house, and was confined to my bed for some days."

Around the World.

VOL. I. JUNE, 1894. No. VII.

BUSHKILL FALLS, PA.

THE GORGES AND WATER-FALLS OF NORTHEASTERN PENNSYLVANIA.

ONLY a few miles north of the break in the Kittatinny Mountains through which the Delaware courses in its open flight to the sea, and still in the same valley of the "Minisink," the "land of fallen waters," opens up a country of rare and striking beauty. In it nature still appears in a wild and largely unconquered state, the forest fastnesses which cling over the mountain slopes still give out the perfume of the forest-primeval, and the song of the tumbling brooks and cascades have yet the virility of first birth. The little that man has done there has barely been more than to make the region accessible, not sufficient to remove, except from the "frill of the land," the virgin freshness that belongs to it. The mountain roadway—recalling memories of time-honored and creaking Conestoga wagons—over which the better part of a century ago the western star guided the restless to the far-off prairies beyond, is still the roadway of our ancestors, roughly cut, and be-bouldered at almost every step. A few hotels, barely sufficient to accommodate those who have in recent years sought admission to this region of wondrous gorges and water-falls, lying deep in their sylvan setting of pine, rhododendron, and mountain-laurel, have found sheltering spots along the one main road which traverses the country from north to south, uniting the Delaware Water Gap with Port Jervis, the tri-State town. On this road are situated the hamlets or towns of Bushkill, Dingman's Ferry and Milford.

For much of its course between Port Jervis and Bushkill the Delaware is bordered, on its Pennsylvania side, by steeply-rising bluffs—the "cliffs of the Delaware"—which mount up to some 800 or 1000 feet above the river. They are the southwesterly continuations of the Catskill Mountains of New York, and in them we find the same geological and structural features represented. The flaggy and slaty rocks are typically Devonian, and their rich fossiliferous treasures are eagerly sought after by the many who have gradually acquired a taste for scientific or pseudo-scientific pursuits. Trilobites, ancient precursors of the modern king-crab, are particularly abundant in these rocks, and the search after them is a pleasant diversion from the simple every-day contemplation of nature.

Across the rugged face of the cliffs a number of streams have worn deep channels and troughs, which, in the more gentle portions of the elevations lengthen out into true rock-gorges or cañons. The gorges of the Sawkill, near Milford, of the Raymondskill, a few miles above Dingman's, and of the Bushkill, near the hamlet of the same name, are examples of such water-troughs, and in them nature has concentrated an amount of beauty of a special kind which is only with difficulty found elsewhere. The ruggedly-rising walls of the cañons are almost everywhere overgrown with a luxuriant and brilliant vegetation, whose varied greens compass all the tints from the nearly black of the fir and spruce to the gray of the lichen and moss which fleck the rocks wherever space has been given them to crowd in. Each cañon terminates in a fall of greater or less magnitude. It would be no easy task to find a region where water-falls are so plentiful, or where they present themselves in such true grandeur. It is not the leap of a few feet, or the break of a mildly-dashing cascade, but the full plunge of seventy to eighty feet or more, with a volume of water which does not as yet require artificial regulation. Down, it might be said, almost into the midst of the forest, into a recess where daylight only indifferently penetrates, the waters are thrown with a deafening roar, to be continued as a partially pacified stream whose course is hence among boulders wrought by its own destructive force.

Bushkill, perhaps on account of the almost unsurpassed richness of the vegetation which clothes its dark cañon, and the refreshing coolness of its solitude, is by many considered the finest fall of the region. Its waters plunge through a vertical cleft of seventy-five feet, to be again precipitated fifty feet, before they enter upon their more peaceful course to the low-winding Delaware below. With most visitors, probably, the pleasantest memories associate themselves with the Raymondskill, in which a wild and romantic nature has been blended into a picture of rare artistic effect. A writer thus describes the picture: "The Raymondskill Falls is a spot of surpassing scenic beauty. The stream has there cut a deep narrow gorge through the Hamilton ridge, and at the bottom of this it descends through a vertical distance of 125 feet in two successive leaps, excavating a beautiful glen, overhung with vertical walls of pine-clad rock, 200 feet high, into whose depths the sun never shines." The same general features are repeated in the Dingman's High Falls and in the yet more turbulent Sawkill, whose course is at one place compressed into a sluice of only two and a half feet width.

Deep though the trenches are in which the tributaries of the Delaware have shaped their courses, there is reason to believe that all of the cutting has been made since the close of the glacial period. Here and there ancient river-channels, buried beneath a mass of glacial detritus—boulders, gravel and clay—point to different courses in a no very ancient period (geologically speaking), and not impossibly all the scenic features of the existing gorges have been wrought out since the occupancy of the land by the great ice sheet.

The forest of Pike and Monroe Counties, the counties to which the region here described belongs, remains about the most undisturbed and untrodden of any in the State. It yet harbors the animals—bear, deer and lynx—which are soon to roam no more. A few lakes are here and there scattered about at elevations of some 800-1200 feet and to it belongs that hunter's paradise, of the Pocono Mountain, which has been significantly designated "The Shades of Death." It is principally to the landscape painter Herzog that the tourist is indebted for bringing to notice this delightful region. Twenty years ago it was still among the unknown. To day the crumbling mill and the wooden bridge of Dingman's Ferry, the blacksmith by the roadside, and the distant fields of buckwheat and ripening corn are pleasant memories to thousands who annually travel over the superb road which winds along and above the Delaware River.

ICELANDIC EXPERIENCES.

DR. KARL GROSSMANN, who has recently returned from a journey across Iceland, gives some interesting statements regarding that much-visited but as yet little known country. Describing the region of Thíngvellir, northeast of Reykjavik, the capital, he says : " In fine weather there can be scarcely a more delightful sensation than that of riding through scenery such as this, so well-known to most Icelandic travelers. The dwarf birch has a fragrance which I have never found anywhere else; legions of large gray moths flit about in the balmy air ; the sun sends down his warming rays ; and in the distance the snow-head of Hecla and the Southern Jöklar stand out from the blue sky. Alas ! this delicious picture soon vanished, never to return for the rest of our journey. . . . Of that vaunted clearness of atmosphere, so deceptive with regard to the estimation of distances, I saw nothing ; on the contrary, I doubt whether an English summer landscape is often veiled in a bluish haze such as constantly shrouded Icelandic scenery while we were there. Moreover, the temperature was truly Arctic. From my companion's previous experience, and from all known accounts, we had prepared ourselves for a pleasant summer temperature, somewhat like that of the Scottish Highlands. In reality we found an everlasting north wind, opposing our progress northwards with unrelenting force for three weeks, chilling us to the bone, once actually compelling us to stop for three days in the wretched though hospitable farm of Stathir, on the Hrútafjörthur. On our way back the wind changed, and, though warmer, still with equal ferocity blew into our faces ; once to such a degree that we could not put up our tent, and had no other choice but to urge on our poor horses for twenty-one hours at a stretch."

Regarding the well-known roadless character of the country, Dr. Grossmann writes: "The typical Icelandic forest, skogar, is formed by fragrant dwarf birches, shrubs of about three to four feet in height. Equally peculiar is an ordinary Icelandic road. It is nothing but a rut cut by the feet of the countless generations of ponies which have been driven along in this direction. These ruts are deep, usually very narrow, and if the luckless rider is endowed with fairly long legs, the riding resembles more a performance on a bicycle than anything else. Often the ruts branch off sideways, and with a jerk the pony may bolt into the branch, when it is difficult to keep in the saddle." Of the inner parts of the great ice-cave of Surtshellir (" black hollow ") our author writes : "On approaching with the candles, we recognized in these pale mushroom-like forms the most gorgeous ice stalagmites, of varying sizes and shapes, scattered all over the slanting floor of the cave, from the densest white to a pale blue of ghost-like transparency. Some were solitary, others formed a cluster; some, in the style of a Gothic spire, were surrounded by a tier of secondary spires, while others, almost mathematically perfect in shape, formed isolated transparent paraboloids. On the northwestern wall of the cave there was a magnificent curtain of long ice stalactites, forming a colonnade and partitioning off a corridor wide enough to allow us to walk along with a lighted candle. Where stalactites and stalagmites had met, somewhat near the middle of this colonnade, they resembled the face of an organ. Add to this the thousandfold sparkling and glittering from those parts of wall and roof which were not draped by graceful icicles, and you will not wonder that we felt completely dazed, as if transported into the midst of a fairy tale of our childhood. With difficulty we tore ourselves away from this enchanted spot. When, at last, we reached the glimmer of daylight, the exit of the cave gave a charming effect. The temperature in the cave and outside on our way back to Kalmanstúnga was + 0.5° C. (33° F.)"

ART AND NATURE IN PHOTOGRAPHY.

PHOTOGRAPHY, like landscape-painting, can be practiced in a number of ways, the most common way being that of simply taking an object or subject which happens momentarily to strike the eye of the operator and reproducing it for the pleasure that it then gives. In this manner are produced an endless number of pictures, which upon the majority of mankind produce little more than a dreary effect—a longing to know as little as possible of the art that by a few has been converted into a science. The all-round study of a subject—that analysis which makes attractive to all, and invests a picture with a permanent interest—is a gift which seemingly but few photographers possess. Yet how simple in its details is this knowledge ! When, nearly thirty years ago, Gutekunst's now almost classical picture of General Grant came out, showing the commander holding a cigar in one hand, with the other hand stowed away in the trouser's pocket, portrait-photography took a new turn, and the stiff and archaic portraits which preceded up to that time were gradually banished to the rear. Braun, of Dornach, had already shown the way to landscape photography, teaching that there was life and vigor in nature beyond what simply appears on the surface. A landscape was made to be felt—to be studied and enjoyed. In this country the most marked advances in landscape photography are due to the early efforts of the National Geographical and Geological Survey, the explorations of which extended into a domain whose surprising majesty and grandeur were not realized until they were depicted upon the negatives of Bell and Jackson—successful competitors with the exponents of German photographic art. To-day all that has been previously done is surpassed by the masterpieces of Vittorio Sella. The few who have enjoyed the wonderful representations of Alpine and Caucasian scenery which in vast abundance have flown from the camera of this master, a careful and experienced mountain climber, are in a position to know what constitutes a picture—to feel that undefinable something which puts one in touch with nature through a simple black and white rendering. We breathe the cold air of the rugged mountain-tops—we know the touch of that cold mantle of snow and ice which hangs from their summits and in the furrowing valleys makes the solid glacier. Nature is seen with nature's own eye and touched by the hand of an artist.

We reproduce in this number another of the matchless photographs of animal life made by Ottomar Anschütz, the *facile princeps* of animal photographers, whose work has been declared by Du Bois Reymond to be the culmination of science in art. The slow and wary approach of the leopard, with eyes set full on the quarry that is soon to be his feast, is the very embodiment of the life-movement of that animal, and speaks so strongly for itself that a description by word is wholly unnecessary. It is a kind of picture that attracts by its own force, that compels study and analysis, and hence proves attractive for more than a passing moment.

GREECE AND MODERN ATHENS.*

MISS ANNIE S. PECK.

(Of the American School of Archæology, at Athens.)

SOME years ago, a traveler, while on the voyage from Western Europe to Athens, was addressed with the following words : "Ah ! so you are going to Greece without being compelled ; you go the right way to work to look for amusement. Imagine mountains without trees, plains without grass, rivers without water, a sun without pity, dust without mercy, fine weather a thousand times more tiresome than rain ; a country where the vegetables grow ready cooked, where the hens lay eggs hard boiled, where the gardens have no leaves, where the color green has been effaced even from the rainbow, where your weary eyes will look for verdure and find not even a salad to repose upon." But the traveler, nothing daunted by this startling picture of a country of which his dreams had been so fair, pressed on to know the worst—to find that, while these words contained a modicum of truth, the land of Greece is yet a realm of beauty ; worthy, not merely of a poet's pen, but of the personal observation of every lover of nature and art, as well for the fascinations of its present as for the glory of its past. Indeed, there is no country in Europe which so well deserves the attention of the student and traveler, as none contains more beautiful scenery, sites of greater historic interest, or such matchless treasures of art.

To reach the "violet-crowned" city, many travelers come from Trieste by a four days' voyage, two of these over the stormy Adriatic ; a route which may be convenient and even agreeable to the hardy sailor, but to be shunned by all whom Poseidon compels to pay tribute, especially at the time of the autumnal equinox, when I, unfortunately, fell a victim to the power of his majesty. For two days there is no land in sight, but the two days following, spent in sailing past the islands of the western

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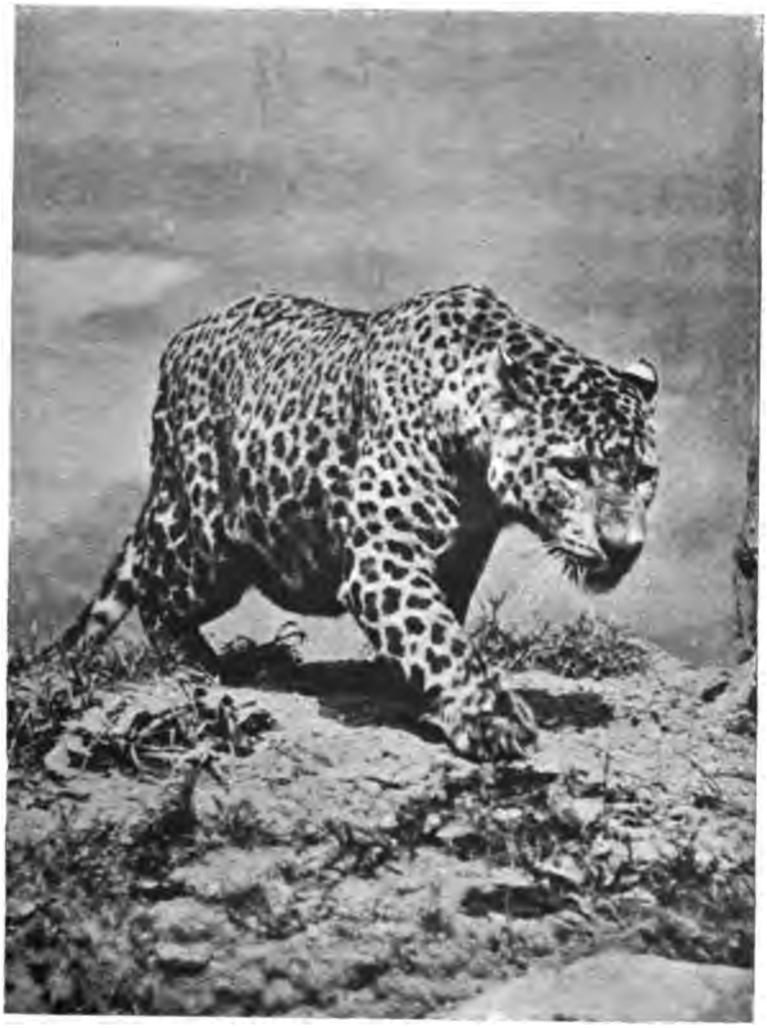
*From an address delivered before the American Geographical Society.



LEOPARD APPROACHING ITS QUARRY.

(Photographed from Life.)

coast, and around the Peloponnesus, are almost a compensation for the wretched monotony of the first half of the voyage.

The first Greek soil to meet our eyes was that of Corfu, ancient Corcyra, where now, as in former days, there is a thriving commercial city.

The glimpses which we gained as we sailed along, of the islands and distant coasts of the Peloponnesus, prepared us to behold a country unlike any that we had previously seen. Here were rugged, almost precipitous promontories, rising abruptly from the sea, apparently barren, and destitute of human habitation. No tints of green gave evidence of pasture or wood, and no curling smoke indicated the presence of life. Far away, indeed, one could fancy that along the head of some deep gulf the coast was less frowning, and that a village was there nestled amid fertile fields; but that was in the dim distance. Near us, all was rocky, barren and precipitous; though in rounding the southern extremity of the Peloponnesus we strained our eyes to catch sight, if possible, of a hermit, who dwells on the face of one of those frowning bluffs, five hundred feet above the sea, his only companion the distant passing sail, for the benefit of which he carefully keeps a light burning through the darkness.

It was dusk ere we reached this promontory of Sunium, so that we missed the pleasure of descrying in the distance the historic spots which we were eager to behold. Our ship was even compelled to anchor outside the ancient harbor, the entrance to which is so narrow that one might well prefer daylight for its passage.

Early next morning we were on deck and, overlooking the fine harbor at our feet, gazed eagerly in search of the far-famed Acropolis, and at the beautiful panorama of plain and distant mountains spread out before us.

But the shouts of the boatmen, who, in their little skiffs, surrounded the vessel, recalled us to the prosaic necessities of baggage and debarkation, and soon our feet were planted on classic soil. A railway now connects the busy seaport of the Peiræus and its forty thousand inhabitants with the more aristocratic seat of government four miles distant, but the stranger on his arrival, in order to save a change from carriage to car and again from car to carriage, is more likely to engage one of the waiting vehicles, which takes him and his luggage direct to his hotel in Athens. It is, however, a rather monotonous drive over a very dusty road; and the driver will persist in halting at the halfway house—he says, to rest his not very stalwart specimen of horseflesh, but more likely to have a chat over a cup of coffee or *raki* (brandy) with some of the inmates. At length the Acropolis draws near; and now, winding around its base, we soon reach Constitution Square, on the sides of which the principal hotels are situated.

To the east, looking down Hermes Street, where the principal shops are located, lies the royal palace, back of the square of green, which is planted with orange trees and oleanders.

But, before examining the city in detail, I should like to give you a general idea of the Athenian plain. You have heard how it is surrounded on all sides by mountains, except toward the sea. If you stand on the Acropolis, facing north, you have on your right Hymettus, on your left, Ægaleos, long ridges extending down to the sea. In front is Mount Parnes, and off to the right, between Parnes and Hymettus, is the graceful peak of Pentelicus. Now, facing in an opposite direction, toward the south and southwest, there is a magnificent prospect of plain, sea, and distant mountains. Four miles away, but in the clear atmosphere seemingly not half that distance, is the beautiful harbor Peiræus and the bay of Phalerum, then the Saronic Gulf, with the islands of Salamis and Ægina: while beyond loom up the mountains of the Peloponnesus and the Isthmus, some rising to the height of 6000 or 7000 feet, the whole forming an exquisite panorama of sea, sky, and mountain scarcely to be equaled elsewhere.

The plain, itself, is far from being level. In the city, besides the Acropolis, rise the hills of the Areopagus, the Museium, Pnyx, and the hill of the Nymphs, and still higher, the peak of Lycabettus, on a spur of which the royal palace is situated. . . . The extremely rocky soil is here apparent, and I noticed that not only does the solid rock, which has a very thin coating of soil, frequently project from the surface, but the plains are strewn with small stones. Even in the cultivated fields near Athens, small stones about the size of the fist were scattered all over the ground; and I thought the Greeks must be very lazy not to clear off their fields. But when I made such a remark to a Greek gentleman, he said: "Oh, no! they were not lazy. They left the stones there on purpose to keep the soil down. If they took away the stones the soil was so light that it would all blow away."

In October, the season of my arrival, almost the whole landscape exhibited a warm, brown tone, which would, I am sure, have delighted the heart of any artist, and was beautiful even to a common mortal who holds a special aversion to that color; for the varied hues of soft, warm tints, from light yellow to darkest seal-brown, were shaded and combined in a manner most pleasing, if one did not reflect that they existed where grass ought to be. The shades of brown were broken only by the green olive groves, which mark where the Cephissus flows, and the gleams of gray and white marble from Hymettus and Pentelicus.

This appearance was owing to the fact that, as usual, there had been practically no rain for four or five months. Naturally, it was frightfully dusty, and most of the country looked like a desert. The summers are very hot and disagreeable, so that most of the people who can afford it go to the seashore; some have cottages at Phalerum, while others go to the islands of the Ægean, where a more equable temperature prevails. Those who remain at home spend the middle of the day in the house, even the shops being closed for several hours at noon. Business is done before 9 o'clock, and again toward sunset the streets are filled with people.

At other seasons, say from the middle of October to May, the climate is most delightful. The winter weather is like our September and October days, with occasional showers and a great deal of brilliant blue sky. Wild flowers blossom all winter, and frost and snows are rare. In the winter of 1885 and '86 there was no snow on the plain, and it appeared only for a few days on the summits of the neighboring mountains. Greece is warmer than Italy, and a far more delightful winter resort.

The autumn rains quickly change the face of the landscape, and later, as you look over the plain, you behold all shades of green intermingling with and superseding the brown, as wheat fields, green grass, and vegetables are clothing the country with verdure. The plain is generally barren of trees except for the olive groves. Hymettus is perfectly bare and rocky, but the other mountains are clothed with a scanty garb of forests. Though rather barren, the Athenian plain is delicate in outline and elegant in all its aspects, like the slender, graceful race it nurtured.

It is obvious that the city in its appearance resembles many others in Europe. The houses are nearly all of limestone and stuccoed, though a few are of white marble. The roofs are tiled with pieces in the shape of a half flower pot. The city can hardly be called beautiful, except in its location and surroundings; though, perhaps, it has reason to be proud of its appearance if its age be considered. There are now a number of broad, handsome streets, but many are very narrow and circuitous, and are lined with small, low houses. On these are queer little shops of all sorts, and the people sit out on the sidewalks, so that one usually finds it more convenient in these quarters to walk in the middle of the street. From some of these shops savory odors greet you; and you see, exposed for sale, innumerable little fishes, from three to six inches long, all steaming hot from the fat-kettle; or perhaps, I should say, the olive-oil kettle. One sees also for sale many hot-cakes about three inches in diameter, which are fried in a similar manner. These are very light, and when eaten with honey form a breakfast dish fit even for an American.

The Greeks of the lower classes live in a very simple and frugal manner. Their earnings are small, laborers receiving not more than twenty-five or fifty cents a day. Many of the houses, especially in the country, consist of only one room, which is used alike as parlor, dining-room, kitchen, and sleeping-room for the family. The majority, perhaps, have not more than two rooms. People generally have no fire (they go out of doors to get warm) except what is needed for cooking purposes, and that is extremely little, as bread is always bought, and the poorer people live mainly on bread and olives—in Athens, no doubt, eking out their scanty meal with some of the little fishes or hot-cakes so freely exposed for sale. Cheese is also a favorite article of diet, and macaroni is much used. The olives are different from those generally seen here, being left on the tree till they are quite ripe, *i. e.*, black. They are then packed down in salt, and in a month or so are ready for eating. They then present the shriveled appearance of a stewed prune, but are much smaller. They seem to be an extremely popular article of food, being very cheap as well as nutritious. The wealthy people live more in accordance with the French style; ordinary articles of food are of moderate cost, except that beef is very dear, and milk and butter are still more so, as pasturage is poor and very few cows are kept in Greece. Indeed, in the rural districts, it is impossible to get any beef or butter at all, and sheep's milk is the best obtainable. In Athens the hotels are well supplied with comforts, both for the outer and inner man ; but in making an extensive tour in Greece, one must be prepared to undergo various privations.

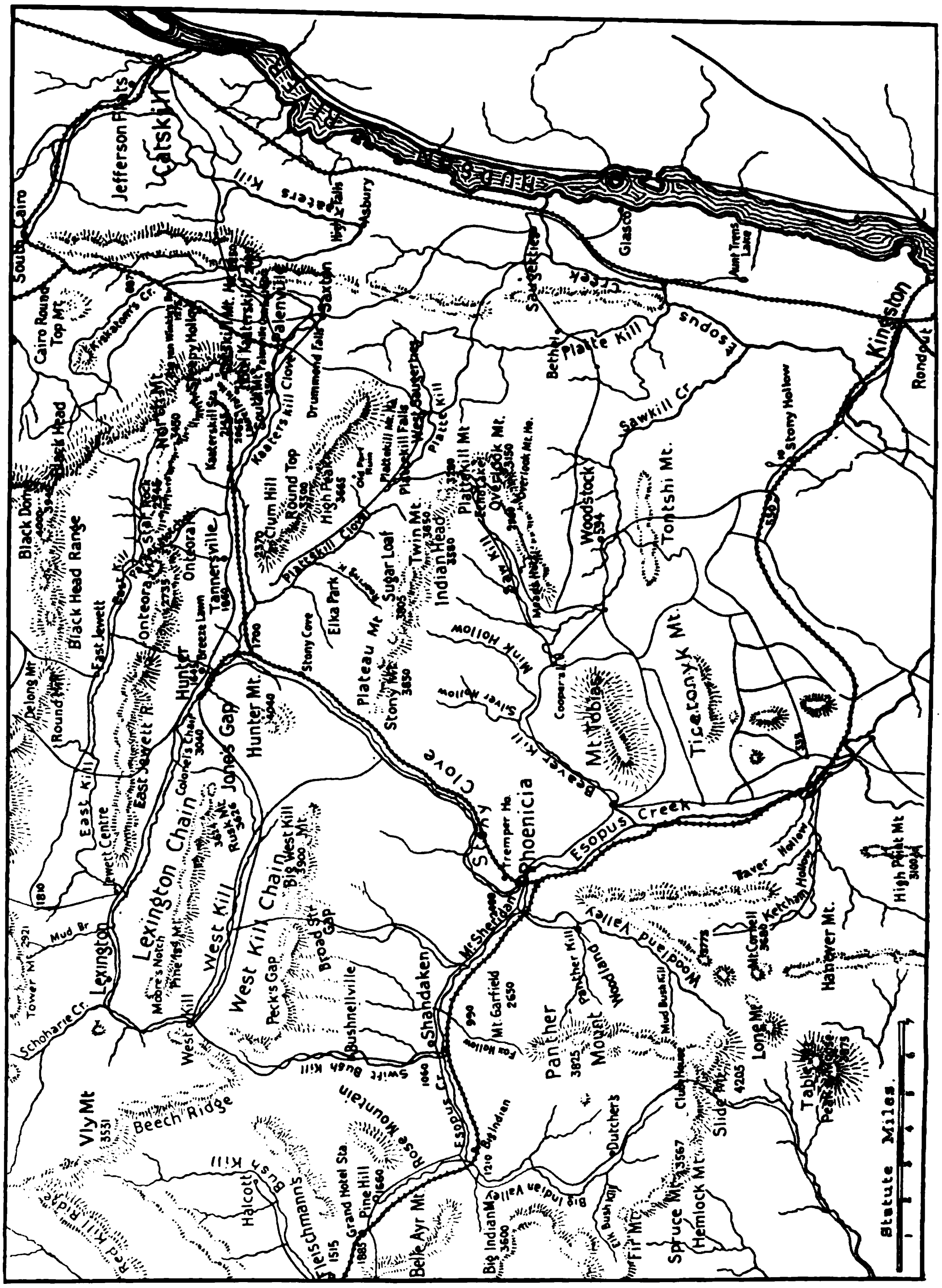
The people are extremely ambitious, and the youth are eager to learn. The small boy does not have to be driven to school, but is anxious to acquire knowledge. As a result the Greeks are the best educated people in the world, not that they have so many eminent scholars, but they have a smaller percentage of illiteracy than any other nation, even Germany, can show. There are numerous public schools and gymnasia scattered all over the country, and Athens boasts of a fine university, organized on the German system, with faculties of theology, law, medicine, and philosophy. It has also a school of chemistry and pharmacy, an observatory, and a library of 150,000 volumes. About 3000 students are enrolled and there is a large faculty.

The language spoken, both in church services and by the people generally, is of course modern Greek. The ancient language was fully developed before the dawn of history, and, contrary to the impression of many, it has lasted to the present day. It is therefore a mistake to speak of the Greek as a dead language, like the Latin. Of course there has been a gradual growth and change, but the difference between modern and New Testament Greek is hardly so great as between that and classical ; much less than exists between the English of the present day and that of Chaucer. The difference in pronunciation, however, is so great that it is often impossible for the classically trained ear, at first. to recognize the most familiar words. There is considerable difference, however, between the written and spoken language, the newspaper and literary Greek being much more like the classical, while the colloquial Greek contains a considerable admixture of Turkish and Italian words. But the Greeks naturally despise the Turks. and are all united in the effort to expel foreign words from their language ; so that it seems probable that they will even succeed in what has been pronounced impossible, in making their language grow backwards.

In fashionable society, however, French is generally spoken. All wealthy people have French governesses for their children, and many Greeks speak German and English in addition. The French fashions in dress also predominate, though some few of the city people and the majority of those in the country have a fashion peculiar to themselves.

NOTES ON THE MAP OF THE CATSKILL MOUNTAINS.

THE very accurate Bædeker thus briefly defines the group of mountains which, by reason of their scenery and proximity to the land of civilization, are held so dear to the American tourist: "The Catskills, the Indian *Onti Ora*, or 'Mountains of the Sky,' are an outlying group of the great Appalachian system, running parallel with the Hudson for about twelve to fifteen miles, at a distance of eight to nine miles from its west bank. They lie mainly in Greene County, New York, and cover an area of about five hundred square miles. Their name is derived through the Dutch name of *Katzbergs*, applied to them on account of the numerous wild-cats that infested them (kill—stream, gorge). Toward the east their declivity is very abrupt, and, as seen from the Hudson, they appear like an almost vertical wall 2000 to 3000 feet high. On the other sides the slopes are more gradual. Deep ravines, known as 'cloves,' are cut into many of the mountains by mountain-torrents." To this brief description it should be added that the Catskills are not mountains in the sense that the Alps or White Mountains are, through the folding-up and crushing of the rock-masses out of which they are constructed, but simply a plateau-surface, of exceedingly gentle slope, which has been cut through in all directions by the plateau streams, and by them worn into the so-called mountain peaks and separating valleys. The forces of nature have dealt lightly with the region, inflicting upon it no catastrophic feature to remind one of the activities which still reign within the earth to shape its outer destinies. The valleys, which have been gradually worn to their low levels, were at one time of the same height as the mountains by which they are now surrounded, and even to-day, from almost any of the more prominent summits, the eye can readily restore the nearly uniform surface which at one time was the country. The peaks rise up to a surprisingly even line—the near summit-line of the original plateau.



The Otis Elevating Railroad connects the Palenville Branch with the Eastern Crest of the Mountains.

MAP OF THE CATSKILL MOUNTAINS.

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FALLS OF THE GRAND RIVER, LABRADOR.

Principal Elevations. — The culminating point of the Catskill Mountains is Slide Mountain (4205 feet), overlooking the deep valley of the Neversink and the Rondout on the south, and not, as is still frequently asserted to be the case, High Peak, on the eastern declivity, the elevation of which is nearly six hundred feet less. We enumerate here a number of the more prominent summits, with determinations of altitude from the most reliable sources :

Slide Mountain (southern face of the mountain region),	4,205	feet.
Hunter Mountain (central tract),	4,040	"
Black Dome (northeastern face),	4,000	"
Big West Kill Mountain (central region),	3,900	"
Peake o'Moose (southern face),	3,875	"
Stony Mountain (east-centre),	3,850	"
Mount Tremper (southern face),	3,840	"
Panther Mountain " "	3,825	"
Sugar Loaf (Mink Mountain) (eastern face),	3,805	"
High Peak (eastern face),	3,665	"
Big Indian (western face),	3,600	"
Indian Head (eastern face),	3,580	"
Round Top " "	3,500	"
North Mountain (northeastern face),	3,450	"
Overlook Mountain (eastern face),	3,150	"

The highest summit thus lacks by 2000 feet the elevation of Mount Washington, in the White Mountains, but this difference in height, so far as scenic effect is concerned, is in a measure compensated for by the depth of the plain from which the Catskills rise, which, opposite the steepest faces of the mountains, may be roundly assumed to be between 500 and 600 feet.

Scenic Features of the Mountains. —It may be readily conceded that the designation of the peaks as "Alpine summits" is overdrawn ; an Alpine character, except in so far as there are evidences of extensive (past) glaciation, is wholly foreign to the Catskills. There are no *Hörner*, *aiguilles*, or needles, no sharp ridges or *arêtes* that are even remotely suggestive of the scenery of Switzerland. Rugged precipices hold the mountains more particularly on the east and south, but generally the individual mountains are gracefully rounded, and carry with them, from base to top—except where the incursions of man have already largely changed the face of nature—a luxuriant growth of forest. The odor of the "forest primeval" still lingers in many parts of the mountains. All the summits are easily accessible, and, while fashion has introduced a dainty Catskill pattern of *Alpenstock*—the use of which is apparently much more generally directed to an attack of the level roadway than to the mountains that lie on either side of it—no mountaineering skill or appliance of any kind is needed to accomplish the different ascents that appeal to the lover of magnificent views. The finest of these views are perhaps to be had from the summits of High Peak, Overlook and Slide Mountains, although by many the most impressive prospect is considered to be commanded by the eastern crest of the mountains, at a height of 2200 to 2500 feet, on which are planted two of the principal hotels of the region.

Barring the two small tarns that lie on the plateau between the North and South Mountains, and Echo Lake near the Overlook Mountain, there are no lakes in the Catskills—a feature that preeminently distinguishes this region from that of the Adirondacks. Streams of one kind or another are, however, far from wanting, and, coursing as they do in several instances directly across the steep escarpment of the mountains, they are there precipitated in imposing water-falls. The most noted of these are the Kaaterskill Falls, which in two plunges, one of 180 feet, and the other of eighty feet, leave the vertical wall of rock which they have worn back into the form of a true amphitheatre or cirque, and the Haines Falls, which, of scarcely less elevation and greater volume of water, are precipitated into the main horn of the Kaaterskill Clove.

Geological Construction. — The great mass of the Catskill Mountains is built up of the upper member of the Devonian formation, the so-called Catskill group of rocks, a correspondent in great part of the Old Red Sandstone of the Highlands of Scotland, many of whose features, indeed, the Catskills closely follow. Over the gray and red rocks of this series, which are but feebly inclined from the horizontal, is deposited a mass of coarse pebbly conglomerate or "pudding stone," which represents the basal member of the Carboniferous formation. It is through this upper rock that the various narrow passages, known as "lemon-squeezers," have been cut. All indications, such as may be gathered from the coarse particles of the sand-rock, the presence of ripple-marks and of sun-cracks, would seem to indicate that the sea which received the sediments which were ultimately to build up the mountain-plateau was a shallow one, the shallowness steadily increasing with the close of the period. Much of the pebbly mass of the pudding-stone may, indeed, have been laid down in a lagoon sea, behind bars and barriers, at a time when the region, through slow uplift, was gradually beginning to rear itself above the water. The formed Devonian rock gave the constructive material to the rocks of the Carboniferous series. Fossils are of comparatively rare occurrence in the Catskill region ; in a few boulder-masses, such as are to be found near the head of Haines Falls, they may yet give joy to the collector of the curious.

The student of glacial geology will find in this region abundant evidence of its former occupancy by the ice of the Great Ice Age. The open ledges, as between the Hotel Kaaterskill and the Mountain House, exhibit beautiful polished surfaces, coursed by well-impressed glacial striæ and grooves; great and small traveled boulders, or erratics, and perched blocks also well attest the passage of the ice, as it resistlessly passed southward in the trend of the Hudson Valley.

COURSING OVER EUROPE.

WHERE TO GO ABROAD. A guide to the Watering Places and Health Resorts of Europe, the Mediterranean, etc. A. R. Hope Moncrieff. London : Adam & Charles Black, 1893.

The editor of this compact book of nearly 500 pages deserves, and doubtless will receive in a silent way, the thanks of the traveling community for the service he has done them in its preparation, for while it is well-known that excellent guide-books of a specific character, such as the indispensable Bædeker, have for a long time been in use, those of a more general character have invited little confidence to them, and more often than otherwise betray an unfamiliarity existing between the author and his subject-matter. Mr. Moncrieff's book is of a different type. Every page, almost, betrays a true, one might indeed say natural, familiarity, and the author invests the pages with a descriptive character which removes them from the category of simple statistical or instructional records. Guide-books are proverbially dry reading ; not so, however, with the one before us. It sparkles with wit and anecdote, which in no way detract from the sincerity of the work, but on the contrary add to its merits, as furnishing true pictures of the life and associations of the localities which are visited. The following from the description of famous Spa in the Ardennes illustrates the method : "Life at Spa in the season seems always to have gone on much as it does now, each day a succession of lounging, eating, flirting, water drinking, gossiping, enlivened with excursions, concerts, games, and other diversions to kill time and keep the patients in spirits. Fashionable ladies and gentlemen never had more sense than they have now, to economize their idleness and use without abusing pleasure. . . . Till this century there was not a decent carriage to be hired in the place, and the streets were so steep and rough that the visitors traversed them by the help of iron-tipped canes. We, who complain of every little inconvenience we may have to put up with at Margate or Oban, have no idea of the discomforts, even hardships, which our ancestors reckoned on encountering when they went from home in search of health or pleasure. Madame de Genlis, accompanying the family of the Duke of Orleans to Spa in 1787, records that, at what she calls a good inn, she had to sleep in a child's cradle, while the future king of the French climbed a ladder to nail some covering over a draughty window, and his sisters made the beds."

We pick out another illustration as showing this method and Mr. Moncrieft's candid impartiality in dealing with his topic : "Many an Englishman has been voted a boor because he did not think of taking his hat off in entering a French shop, while his wife might ignorantly give cause for scandal by taking the sofa uninvited at one of those coffee conventicles, which are a German lady's substitutes for afternoon tea. . . . Mr. Henry James, no partial critic, testifies that an English traveler is now rather to be be noted for his sociability, and our experience has been the same. We have often observed in crowded railway carriages how one's countrymen were superior in considerateness for others and attempts to make themselves pleasant, even at the risk of bad grammar; while French travelers sat scowling at one another, each perhaps doubtful as to his neighbor's sentiments *de republicâ*, and Germans behaved as if the whole carriage were their private smoking-room. Certain of Mr. James's own fellow-citizens, who travel fast and far without much social education or experience of the world, are largely answerable for our bad name in this respect, while indeed an American gentleman is apt to prove himself one of the most sensible and agreeable of traveling companions. The prize for international rudeness may perhaps be awarded to some newly-married Teutonic professor, with his devoted wife to keep the best seat for him, to feed him with sausage at frequent intervals, and, by her exclamations of admiration, to give the signal for his stretching himself out of the window, so that a back view of him shall block this or that *wunderschön* prospect from the rest of the company. Our Jim and 'Arry can be quite as offensive; but they more commonly prefer to take their honeymoons and holidays at Brighton or Blackpool."

Mr. Moncrieff is an enthusiast over the Black Forest, the charms of which are said to be beyond the reach of words; and he relates the following curious incident, which was communicated to him, as showing still the primitiveness of the region which is yearly becoming more and more popular with the summer traveler: "A few years ago I spent a very pleasant time at Auerbach. I lived in lodgings, paying 8*s*. a week for one of the best rooms in a villa standing in its own garden. Of my two landladies one was a countess, nothing less, who, by several means, was not above turning an honest penny—*e. g.*, I have seen this lady of title carrying up water for a shower-bath, used by any one in the village, at a charge of 25 *pfennigs*, about 3*d*. The ladies, as usual, *vons* as they might be, did much family work with their own hands. . . . At the there fashionable hour of half-past twelve the ladies and I dined; an excellent meal of three courses being sent in by a professional woman cook in the village. The price was 1*s*. 6*d*., of which I paid half, on a just reckoning that I ate as much as the two ladies together."

The traveler who has not for a number of years visited the European continent will find in almost every section of Mr. Moncrieff's book evidences of those great changes taking place which seem destined at no very future day to completely strip from the different resorts their specially distinctive characters; the small and the large places are being monotonized alike. Of course it is largely the railroad that is responsible for this, and nowhere are its incursions so much to be deplored as in Switzerland. The charms of such sequestered valleys as those of Lauterbrunnen and Grindelwald, and of the eagle-heights of Mürren and of the Jungfrau will soon be a recollection only with the past generation; even famous Vallombrosa has fallen a victim to the cog-wheel device. But a good measure of comfort comes with this change, and perhaps most travelers will welcome, rather than decry, the encroaches of our more modern civilization.

Contrast the present approach to Mentone with what it was in the earlier days of Mr. Moncrieff's experience: "The present writer has a vivid recollection of a long, cold journey over frost-bound France, ending at midnight of the second day, when the lumbering diligence rattled through the long, white, ghostly streets, after a crossing of the mountain at Turbia that left a chill in one's bones for hours. Next morning early he strolled out to see the terraced grove bright with sunbeams playing between mossy trunks, in an air as mild and balmy as that of an English June, the birds caroling, the flowers blooming all around; above, through the glistening leaves of the olives, the softest blue sky; below, the calm sea, shining jewel-like with shifting hues of green and light blue near the shore; then, farther out, deeping into a broad sheet of ultramarine, edged with gold, beyond which, in the clear distance, loomed the peaks of Corsica, nearly one hundred miles off. It was no dream. Two days' travel could bring one from the depth of winter into the height of spring—such a spring as the Italian poets describe, and our deceitful rhymesters work themselves into raptures about, without having seen any such thing."

"See Naples and die" still exists as an old proverb, and probably for many generations yet to come will the proud city of the Neapolitan Bay remain in virtually undisputed possession of its claim to unsurpassed situation. But even here much of the ancient picturesque quality is about to depart, and before long the implication that the sky is the one clean thing about Naples—clean because the Neapolitans cannot attain to dirty it—will be buried with the past, together with the many odors and gaseous emanations which have so long been dear to the lounger in Santa Lucia. "Roused out of their habitual carelessness by the cholera epidemic of 1884, the Neapolitans have now been exerting themselves to set their sanitary house in order. No less than £4,000,000 has been voted for this work, an expense that should prove profitable in the end. The worst streets are being pulled down, admitting air and light to the dense masses. Twelve thousand houses have been demolished, so that the population is much less thickly crowded over the limits of the city. Santa Lucia itself is about to disappear, almost the last feature of picturesque but dirty old Naples."

The extracts that we have given from Mr. Moncrieff's book sufficiently show its character, and will serve to place it apart from the ordinary guide-book. It is prepared with special reference to watering-places and health-resorts, and naturally the characteristics of these are mainly dwelt upon, and good analyses furnished of the nature and quality of the different waters, the climate, etc.; but the work is rich in other material, and will well supplement the more practical guide-book that should belong to every exact tourist.

THE GRAND FALLS OF LABRADOR.

MR. HENRY G. BRYANT, who in June, 1891, organized an expedition for the exploration of the Grand River of Labrador, primarily with a view of penetrating the cloud which still veiled the mysterious "grand falls," with which tradition had associated a grandeur equaling, if not surpassing, that of the most famous of the world's water falls, gives in the most recent publication of the Geographical Club of Philadelphia a complete account of his journey, a preliminary notice of which had already appeared in the *Century Magazine*. The voyage up the rather turbulent Grand River below the falls occupied just one month, during which time the little party experienced an amount of hardship almost bordering upon privation. We extract from the report, with the permission of the author, the description of the central object of the exploration :

September 2d was a day memorable as marking the date of our arrival at the Grand Falls. A rough march over the rocks and bogs intervened, however, before we reached this goal. As we approached the river, spruce forests of a heavier growth appeared, and pressing on through these, although we could no longer see the overhanging mist, the deep roar of falling waters was borne to our ears with growing distinctness. After what seemed an intolerable length of time—so great was our eagerness—a space of light in the trees ahead made known the presence of the river. Quickening our steps, we pushed on, and with beating hearts emerged from the forest near the spot where the river plunged into the chasm with a deafening roar.

A single glance showed that we had before us one of the greatest water-falls in the world. Standing at the rocky brink of the chasm, a wild and tumultuous scene lay before us, a scene possessing elements of sublimity and with details not to be apprehended in the first moments of wondering contemplation. Far up stream one beheld the surging, fleecy waters and tempestuous billows, dashing high their crests of foam, all forced onward with resistless power toward the steep rock, whence they took their wild leap into the deep pool below. Turning to the very brink, and looking over, we gazed into a world of mists and mighty reverberations. Here the exquisite colors of the rainbow fascinated the eye, and the majestic sounds of falling waters continued the pæan of the ages. Below and beyond the seething caldron the river appeared, pursuing its turbulent career, past frowning cliffs and over miles of rapids, where it heard "no sound save its own dashings." The babel of waters made conversation a matter of difficulty, and after a mute exchange of congratulations we turned our attention to examining the river in detail above and below the falls.

A mile above the main leap, the river is a noble stream 400 yards wide, already flowing at an accelerated speed. Four rapids, marking successive depressions in the river bed, intervene between this point and the falls. At the first rapid the width of the stream is not more than 175 yards, and thence rapidly contracts until it reaches a point above the escarpment proper, where the entire column of fleecy water is compressed within rocky banks not more than fifty yards apart.

Here the effect of resistless power is extremely fine. The maddened waters, sweeping downwards with terrific force, rise in great surging billows, high above the encompassing banks, ere they finally hurl themselves into the gulf below. A great pillar of mist rises from the spot, and numerous rainbows span the watery abyss, constantly forming and disappearing amid the clouds of spray. An immense volume of water precipitates itself over the rocky ledge, and under favorable conditions the roar of the cataract can be heard for twenty miles. Below the falls the river, turning to the south-east, pursues its maddened career for twenty-five miles, shut in by vertical cliffs of gneissic rock, which rise in places to a height of 400 feet. The rocky

THE RAPIDS ABOVE THE GRAND FALLS LABRADOR.

banks above and below the falls are thickly wooded with firs and spruces, among which the graceful form of the white birch appears in places.

Soon after our arrival Professor Kenaston, with Montague's aid, set about making a measurement of the falls. In an address delivered before the National Geographic Society, January 29, 1892, Professor Kenaston described the method employed as follows: "At St. Johns, Newfoundland, we had provided ourselves with several balls of stout linen cord, with which to measure the height of the fall, if the situation should be found suitable. Fortunately, alongside the chute, just above the brink of the main cataract, we found a floor of rock of the same slope, about thirty degrees below the horizontal. Along this it was possible to go, but with some peril, nearly to the edge over which the stream plunges in its final descent. Fastening a heavy billet of green fir to one end of the cord, the weight was carried and thrown down on the surface of the rock to the brink of the falls, the cord being paid out from the upper end of the slope. A knot was made in the cord to mark the distance to the edge, and the billet was allowed to fall over the edge of the precipice into the chasm. Montague, having climbed along the bank at the edge of the cañon, was holding on by the trunk of a tree, from which he could see when the block of wood struck the water below as the cord was paid out by me above. The instant of contact was plainly visible to him, and I was equally sensible of it. The cord was now drawn up over the edge and carefully measured with a tape-line. The whole length paid out was 505 feet, the part which measured the slope was 189 feet, leaving for the height of the main fall, below the chute, 316 feet. Allowing for a few degrees deviation from the perpendicular, and for a slight stretching of the cord, though this last was probably counteracted by wetting, the height of the fall may be considered something more than three hundred feet. The vertical height of the chute, about thirty-two feet, added to the other measurement, makes the descent from the head of the chute to the surface of the water in the chasm about three hundred and forty-eight feet."

The Grand Falls of Labrador, with their grim environment of time-worn, archaic rocks, are one of the scenic wonders of this western world, and, if nearer civilization, would be visited by thousands of travelers every year. They are nearly twice as high as Niagara, and are only inferior to that marvelous cataract in breadth and volume of water. One of their most striking characteristics is the astonishing leap into space which the torrent makes in discharging itself over its rocky barrier. From the description given of the rapid drop in the riverbed and coincident narrowing of the channel, one can easily understand that the cumulative energy expended in this final leap of the pent-up waters is truly titanic.

If a substratum of softer rock existed here, as at Niagara, a similar "Cave of the Winds" would enable one to penetrate a considerable distance beneath the fall. The uniform structure of the rock, however, prevents any unequal disintegration, and thus the overarching sheet of water covers a nearly perpendicular wall, the base of which is washed by the waters of the lower river. In spite of the fact that no creature, except one with wings, could hope to penetrate this subaqueous chamber, the place is inhabited, if we are to believe the traditions of the Labrador Indians. Many years ago, so runs the tale, two Indian maidens, gathering firewood near the falls, were enticed to the brink and drawn over by the evil spirit of the place. During the long years since then, these unfortunates have been condemned to dwell beneath the fall and forced to toil daily dressing deer-skins; until now, no longer young and beautiful, they can be seen betimes through the mist, trailing their white hair behind them and stretching out shriveled arms toward any mortal who ventures to visit the confines of their mystic dwelling-place.

The Indian name for the Grand Falls—Pat-ses-che-wan — means "The Narrow Place Where the Water Falls." Like the native word Niagara—"Thunder of Waters"—this Indian designation contains a poetic and descriptive quality which it would be hard to improve.

NOTES ON MOUNTAINS AND MOUNTAINEERING.

MOUNT GODWIN AUSTEN OF THE HIMALAYAS.—For many years the peak which has been designated by this name, and which is also known on the official charts of the Indian Trigonometrical Survey as K2 and K13, has been recognized as the second highest mountain elevation of the earth's surface, overtopping Kunchinjinga by about one hundred feet, and falling short of Mount Everest by only 750 feet. Its generally accepted height is 28,278 feet. Latterly, the distinguished Alpinist, Mr. W. M. Conway, who has achieved an unprecedented success in high-mountain climbing in the Himalayas, has attempted to show that the elevation of the peak was overstated by some five hundred feet, and that its true position was third in the series of giant mountains of the globe. Mr. J. T. Walker, the late Surveyor-General of India, in a communication addressed to the editor of the *London Geographical Journal*, reviews the facts in the case, and affirms that the original values given for the mountain "may be accepted as true within a few feet." The peak therefore stands—with approximately 28,250 feet—the proud monarch of the Karakoram range.

SINGULAR ELECTRIC PHENOMENON IN THE CAUCASUS.—Herr Pastukhoff, who made an ascent of Elbruz and the Khalatsa peak, records an interesting experience on the summit of the latter mountain, the elevation of which falls just below 12,000 feet. The members of the party were enveloped in a snowstorm, during which they were surrounded by a most beautiful display of electric fires; all their fur coats, their hair, their moustaches, as well as the poles of their tents and all metallic things, were enveloped in luminous discharges, which came to an end only after a discharge of thunder. The thunderstorm is described as having been terrible, one discharge of globular thunder rendering the party senseless for a time.

THE ASCENT OF MOUNT EVEREST.—Mr. Whymper, the well-known Alpinist, who, with the unfortunate Michel Croz, first scaled the supposed inaccessible Matterhorn (July, 1865), and who has since achieved special success as a mountaineer in his attacks upon the equatorial peaks of South America, in a lecture recently delivered in London expressed his willingness to attempt the ascent of the highest of the Himalayas (29,002 feet). The main difficulty of this ascent he believes to be a monetary one—the expense of establishing a number of stations imposed one over the other at comparatively short intervals, where protracted halts might be found to be necessary. This expense, it is estimated, would be in the neighborhood of $25,000 or $30,000.

EARLY ASCENTS OF ALPINE SUMMITS.—It would seem that the winter snows are rapidly beginning to lose their terrors for the Alpinist, and that winter tours, despite the little that recommends them, will in a short time become truly *en règle*. Mr. Sidney Spencer, accompanied by the guides Christian Jossi and Adolf Schaller, successfully made the ascent of the Dom, 14,937 feet elevation, on the 12th of January last. Even the "terror-striking" Matterhorn has fallen within the category of winter possibilities; the first ascent of this mountain in the present year, undertaken apparently under specially favorable conditions of snow, was made on March 27th, by Herr Simon, of Strassburg, accompanied by the guides Pollinger and Burgener.

THE VIEW FROM MOUNT RAINIER (TACOMA).—Mr. Ernest C. Smith, who in a late number of *Appalachia* describes his ascent of the "proud peak of the West," gives the following picture of the view from the summit (14,444 feet elevation): "A few clouds cling in the valleys below, but our gaze travels out, out until it seems as if the ends of the earth must be within the range of our vision. Yet the world we see is a world of mountains. They rise, range behind range, like the serried ranks of a mighty army, with here and there a snow-clad monarch standing out from the common herd. Mount Baker, two hundred miles to the north, is easily distinguished; the peaks to the southward, even beyond the Oregon border, are distinctly outlined against the sky; eastward are long mountain ranges; westward the rugged Olympics close our view, shutting out from us the ocean. Between us and the Olympics lie the waters of Puget Sound, but over them hovers a veil of cloud. I have stood on other mountain summits, but never on one that so overtopped all its mates, where I felt so completely lifted above all barriers, where the effect was so like a bird's-eye view." A mountain-view that commands 200 miles is at all times extraordinary, and it must be said that only the most exceptional conditions of atmospheric purity permits of this long range of vision. Some of the highest summits of the Andes are reported to have been seen off the west coast of South America from this distance, and the Himalayas enjoy perhaps a similar distinction, but we believe that there is no authentic record of the highest of the Alps being seen from this distance. Possibly the identification of Mount Baker is an error.

THE SNOW-LINE.—Herr Wichmann, the well-known geographical critic and statistician, furnishes to Justus Perthes' *Taschen-Atlas* the following positions for the snow-line at different parts of the earth's surface, as determined by the latest explorations :

	Lat. North.	Metres.
Spitzbergen	77°	460
East Greenland	72°-74°	900-1250
Iceland	65°	900-1300
West Greenland	63°	1220
Norway (Dovrefjeld)	62° 20′	1600
St. Elias (Alaska)	60° 17′	1500
Mt. Hooker (Canada)	52°	3000
The Tátra (Hungary)	49° 10′	2180
Bernese Alps	47°	2750
Mont Blanc	46° 45′	2680-3100
Caucasus (southern face)	43°	2900-3600
Caucasus (northern face)	43°	3300-3900
Pyrenees “ “	43°	2700-2800
Pyrenees (southern face)	42°-43°	3000 +
Thianshan Mts	42°	3750
Mt. Ararat	39° 42′	4300
Mt. Etna	37° 30′	2900
The Taurus	37° 20′	2900-3250
Sierra Nevada of Spain	37° 10′	3100
Mt. Demavend	36°	4300
Kuen-Lun Mts	36°	4800-6000
Mt. Lebanon	34° 18′	2960
Karakoram (northern face)	35° 30′	5670
Karakoram (southern face)	35° 20′	5920
Tibet	32°	5500-6000
Himalayas (northern face)	28°	4800
Himalayas (southern face).	27°	4900
Popocatepetl	18°	4700
Ras Dashan (Abyssinia)	13°	4300
	Lat. South.	Metres.
Equatorial Andes	1° 30′	4810
Kilima 'Njaro	3°	5000
Bolivian Andes (eastern face)	16°	4850-5040
Bolivian Andes (western face)	16°	5620
Aconcagua	32° 39′	4485
Corcovado (Chili)	43°	1800
New Zealand (South Island)	43° 36′	2300
Straits of Magellan	53° 54°	1100
Tierra del Fuego	54°	1070

REVIEWS.

ALASKANA : ALASKA IN DESCRIPTIVE AND LEGENDARY POEMS. By Bushrod W. James, A. M., M. D. Philadelphia : Porter & Coates, 1893.

The many tourists who now annually flock northward to gaze upon America's wonderland of ice and snow will receive with real pleasure Dr. James's Alaskan descriptive verses, which, indeed, are certain to find a large audience among all who are imbued with a poetic fancy. They breathe an air of exceptional freshness and fragrance, and scatter that perfume of nature which is an emanation alone from the workshop of the poet. Dr. James, who is already well-known as the author of "American Resorts and Climates," shows himself in the work before us to be a true poet, and one possessed of a masterful descriptive power. His legendary poems, which follow strictly the thread of the native legends, are full of pathos and feeling, and beautifully diversified by the variety of subject which they touch, from the wreath-crowned Mt. Edgecumbe to the glacier of the Stickeen and the "Raven" and "Owl." The customs of the people and the grand aspects of Alaskan nature—mountains, waters and the primeval forest—are depicted with equal beauty and grace, and in a most happy rendering of Hiawathan rhythm. The book, which is most attractively illustrated, is a new departure from the traveler's pen, and certainly makes for itself a distinct place in American literature.

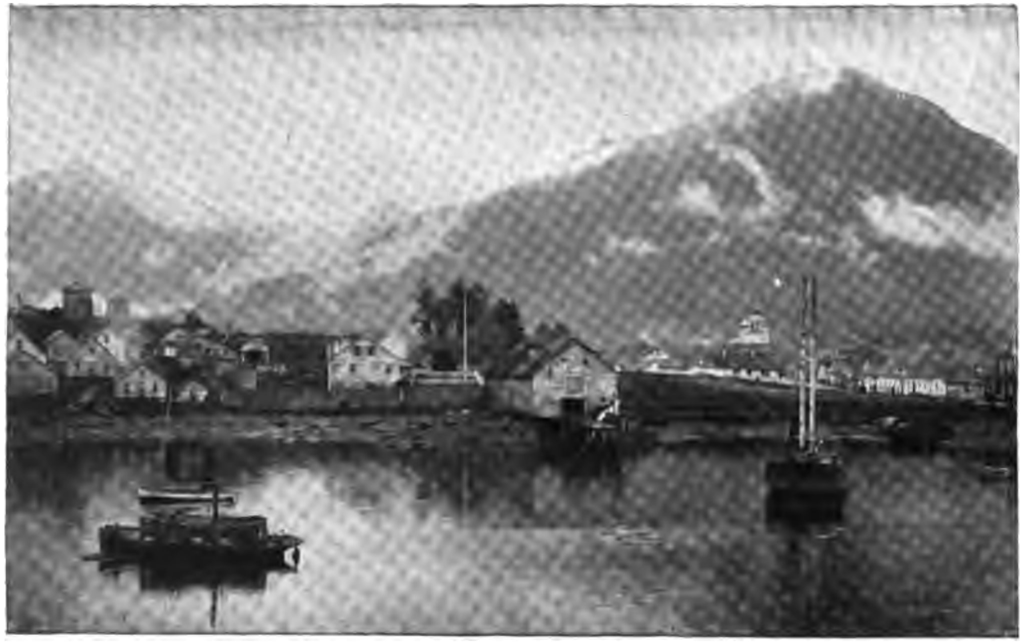
The following description of Sitka speaks its own method :

Look, the sound is faintly tinted
With the sun's departing glory !
Where the mountains frown the shadows
Slowly creep to darker shading ;
Tree-tops bend toward the water
Where their pictures, softly mingling
With the rippling waves and eddies,
Lose themselves in changeful fragments –
Bound and bend in leafy patches—
On the crested wavelets dancing,
In the glass-like hollows sinking,
But to rise again and glisten
In the twilight's lingering beauty.
Here a cup-like blossom tosses
Perfume, like a dream of sweetness,
To the breeze, which bears it onward
Toward the sky whose blue is rarest
Where the misty clouds break open.
See the shades of pink and golden,
Resting on the blue, like jewels –
There the banks of gray grow rosy
Where the glow but tips their edges ;
And the waves, reflecting, gleaming,
Re-repeat the cloud-land's fairness,
Till the air is brightly laden
With the evening's tender welcome.
O'er Verstova's misty grandeur
Lights and shades are slowly creeping,
There a glint of gold is heightened
By a line of velvet darkness ;

Tints of pink and purple blended
Float around his sides and paint them—
But his haughty head lifts proudly
Far beyond the sunset shading.
O'er it rests a golden halo,
With no cloud to dim its glory.
Edgecumbe's sides blaze richer, redder,
Where the beaming sunlight gilds them ;
Here and there a snow-wreath loiters
To enhance his lonely splendor,
While the night seems slowly rising
From his deep and silent crater,
Spreading o'er his top its blackness
Ere it shadows earth and water.
Hush ! Across the sound's clear ripples
Hear the silvery chimes repeating
Notes that wake the sleeping echoes
In the mountain's rugged summit—
Tones that ring across the valleys
And reverberate so sweetly
From the rocks and gloomy caverns,
Touching every point and crevice,
And rebounding, waving, rolling,
In one glorious diapason.
Whence the sound ? Old Sitka's steeple
Rears itself in emerald brightness
Near the sound and in the valley,
Where the quaint old town is nestled,
And the angelus resounding
Day-by-day the sound-waves carry
Far beyond the streets and dwellings—
Up and out till nature answers
With the voice that bides its bidding
In the dim and rock-bound distance.
In the church, the sacred pictures
Glow with plate of gold and silver,
Gleam with rarely precious jewels,
Out from which the tender faces
Shine in strange, unearthly beauty.
Altar, walls, and windows glisten
With a grandeur gayly brilliant,
Which the Church of Greece has chosen
As her own from distant ages.
But the house for native worship,
Out beyond the Church's shadow,
Seems to lack the need of lasting,
So its crumbling walls and rafters
Tell that soon the time will hasten
When the only sign to mark it
Will be crushed and broken timbers !

The Use of Governmental Maps in Schools. By W. M. Davis, C. F. King and G. L. Collie. New York : Henry Holt & Co., 1894.

This exceedingly modest pamphlet of less than seventy pages, published with a view to calling attention to and analyzing certain maps of the national surveys which best illustrate the physical features of our country, and of pointing out their teaching powers, is worthy of an honorable position alongside much weightier tomes. It is, indeed, an epitome of the physiography of a continent, carefully outlined, put into the smallest number of words, and so rendered as to make it clearly intelligible to all who possess the rudiments of geological knowledge ; and what is of special significance, it reads its own knowledge largely from the face of the map, thereby firmly uniting the two subjects of geology and geography. Professor Davis's name has long been associated with the work of physiographic analysis, and nowhere has he rendered better service to his favorite science than in the pages which he and his colleagues dedicate to the thousands of teachers who in one way or another are associated with geographical service. The method of the pamphlet will best be understood from the following extracts, referring to special maps of the United States Geological Survey : "No. 33. *Volcanic Lakes, Ashland, Oregon.*—Lakes of oval or circular outline are sometimes found in *calderas*, formed by the destruction of the central part of a volcanic cone by some kind of eruptive agency, leaving a deep depression, inclosed by precipitous walls. Crater Lake, represented on this sheet, is a remarkable example of this kind ; its waters being 2000 feet deep, while the inclosing walls rise 2000 feet or more above the lake. The valleys, descending on the outer slope of the volcano, notch the rim of the caldera ; thus showing that they were formed before the cone was destroyed. Lakes of the same kind are known in Mexico, Azores, Italy, Sumatra and elsewhere." "No. 39. *Transverse valleys. Harper's Ferry, Va.*—The relation of the transverse gorge of the Potomac at Harper's Ferry to the (longitudinal) Great Appalachian Valley, or Shenandoah Valley, as it is here called, is well shown in this sheet. The Potomac comes from the mountains west of the valley, and maintains a tolerably direct course to the sea. It has cut down its superb gorge across the Blue Ridge, and just as fast as this gorge was deepened, the Shenandoah proceeded to cut down its longitudinal valley. The gorge, being cut in hard crystalline rocks, retains steep walls ; but the Shenandoah Valley, being cut along the weak limestones and shales of



SITKA AND MOUNT EDGECUMBE.

the valley belt, has already widened into an open valley lowland, behind the hard rocks of the Blue Ridge on the southeast."

It is hardly necessary to emphasize the benefits which teachers can and should obtain from this publication, which, however, touches not only the teacher, but every student as well, be he a student under school or college guidance or merely one of the more cheerful atmosphere of the home library. We would almost wish that some of the conclusions presented to the reader were a little less positive or final, as it can hardly be accepted that our knowledge regarding past changes in certain earth features is as yet so complete as to bar out revision. No phase of geological inquiry requires more caution in its handling than terrain reconstruction, and no part of this reconstruction is more doubtful than that which is based upon assumed differential movements of the land-mass and the alteration of water-courses through such movements. As a supplement to this work should be mentioned Professor Davis's analytic "List of Geographical Lantern Slides," prepared for use in the Cambridge Public Schools, which has just been published under the authority of the School Committee of the city of Cambridge (Mass).

HINTS TO THE TRAVELER AND NOTES ON APPLIANCES OF TRAVEL.

SLEEPING-BAGS.—The one purpose of the sleeping-bag is to afford convenient shelter to the traveler in regions where open exposure to the cold night air is anything but agreeable. It is, however, an erroneous supposition to assume that these articles of travel are serviceable only in Arctic or sub-Arctic regions. They have long been used by the sturdy mountain pickets of the Pyrenees as their principal mountain shelter, and nothing short of a complete house could afford that amount of comfort which is to be obtained from these restricted fleece-lined cases of sheep. That a more general use of the sleeping-bag has not been made by travelers as well as by official expeditions is not a little surprising, seeing how readily it can be obtained and of what light weight it can be manufactured. It ought, indeed, to be recommended for almost all manner of camping tours, for even in the tropical and subtropical regions the temperature of the night air is such as to make "solid" covering at least pleasant, if not absolutely necessary. The goat-clad goatherd of the Roman Campagna is a familiar object in the summer days of Central Italy, and the heated plains of Hungary are none too warm at night for the sheep-clad shepherd of the Alföld. A light sleeping-bag need not weigh more than eight or nine pounds, including the canvas case which is sometimes put over it as a protector. The common form is merely a case of sheep-hide, with the fleece on the inside, sewed up on all sides, except the top, in such form as to conveniently contain a single person. A hood prolongation may be advantageously appended as a special covering for the head, and reversible "arms" are preferred by many with a view to facilitating final adjustment of the draw-strings after the body has been slipped in. For high mountain ascents a sleeping-bag is almost a necessity, but even in lower tracts, such as the Adirondacks, the Catskills and the White Mountains, or even in the bottom pine-woods of Maine, it would afford to the camper, be he professional or tourist, a much more generous comfort than can often be had in the idyllic, but too frequently chilly, spruce-cabin. For Arctic service the moose or reindeer-pattern, such as was devised by Mr. Peary, is the most serviceable. Both Mr. and Mrs. Peary slept in the open in their sleeping-bags when the thermometer registered —40° F., without experiencing special discomfort.

THE AZORES OR WESTERN ISLES.—These may now be considered a new resort opened to those who have become fatigued with the ordinary routes of travel and are searching for the less-frequented channels of outpouring humanity. Direct steamship communication with New York, with sailings about every two or three weeks, brings these islands, rich with the fragrance of the tropics, yet so tempered in their oceanic surroundings as to maintain a delightfully equable winter and summer temperature, within easy reach of the tourist. The sea-voyage requires from six to eight days. The beautiful scenery, insular methods of the inhabitants, and their marked hospitality to strangers, might be considered in themselves sufficient allurements for the journey, but the Azores have a further claim for consideration in the benefits which they confer upon the health-patient. To the rheumatic and to those suffering from various forms of nerve and skin diseases they are considered to offer special relief.

MAGGI'S BEEF-SOUP.—*Alpina*, the official organ of the Swiss Alpine Club, warmly recommends this exceedingly palatable beef-bouillon to all mountaineers, classing it as one of the essentials of a high-mountain journey. There is perhaps no other beverage which so nearly corresponds in taste and flavor with ordinary beef-broth. It has the nutritious qualities of the older and better-known preparations of the same nature, while it lacks the peculiar *gout* of the others which is so distasteful to many. The bouillon can easily form a part of the equipment not only of the mountaineer, but of every touring-party, since it is easily transported and manipulated, and seemingly resists all ordinary changes of climate or temperature.

SUMMER TOURS TO A NEW "LAND OF THE MIDNIGHT SUN."—Norway has hitherto enjoyed almost the exclusive privilege of ministering to those who have sought the glories of the non setting sun, but it appears that before long it will have a vigorous competitor in western Greenland. The Arctic tour which is being arranged for this summer by Dr. Cook, one of the associates of Mr. Peary in the expedition of 1891–92, is the beginning of what is not unlikely to be a series of successful enterprises in the near future. With a little of the dangerous element in it to give special life to the tour, the chances of mishap, under the guidance of a competent and conservative navigator, are yet not such as to make the journey really hazardous. The mountain scenery of Greenland is very similar to that of Norway, and if perhaps somewhat less grand, the deficiency is more than compensated for by the special attractions of vast ice-fields, innumerable icebergs, and the allurements of an almost interminable ice-cap. To these must be added what cannot but be a delight to every thoughtful traveler—the study of a singularly primitive and isolated people, the Eskimo.

NOTES.

MEAN ELEVATION OF THE UNITED STATES.—Mr. Henry Gannett, of the National Geological Survey, has made a detailed calculation of the average elevation of the United States, and of the different States composing the Union. For the former he finds a value of 2500 feet, or more than triple that which was assumed by Humboldt (747 feet) for the entire North American continent. It is interesting to place in this connection Humboldt's estimate of 1162 feet for the most elevated continental region of the earth's surface—Asia. Chavanne has determined an approximate elevation for the African continent of 2175 feet. Mr. Gannett's computations are based upon a close study of contour lines of 500 and 1000-foot intervals, and doubtless represent a fair amount of accuracy. The loftiest territorial division of the Union is apparently Colorado, with 6800 feet; then follow Wyoming, with 6700 feet, and Utah, with 6100 feet. No part of Wyoming is depressed below the 4000-foot line, and all of Colorado is above 3000 feet. Delaware, with a mean elevation of only 60 feet, is the least elevated of all the States, being followed in close succession by Louisiana, Florida (100 feet), and Rhode Island (200 feet).

A HIGH SOUTHING IN THE ANTARCTIC SEAS.—It appears from a letter received by Dr. John Murray, the geographer of the *Challenger* Expedition, from M. Christensen, of Norway, that there has been an unusually small quantity of ice in the Antarctic seas during the past year, so little, indeed, as to have practically destroyed the seal-catch which was contemplated by a number of Norwegian whalers operating in those waters. One of these penetrated, off Graham Land, to the 69th parallel of latitude, which is the most southerly point that has up to the present time been reached by steam-vessel. It is claimed that much new land was discovered in the course of the cruise.

THE FORMER EXTENSION OF THE CASPIAN SEA.—The Russian geologist Konshin shows, in a recent memoir published by the Caucasian Branch of the Russian Geographical Society, that the earlier representation of the Caspian Sea as a basin having an east and west extent was the correct one. In antiquity a broad gulf stretched northeastward to what is now the Sea of Aral, uniting with it, while a more southerly gulf or arm penetrated quite to the longitude of Merv. It is a comparatively recent desiccation of the waters which has brought about the modern separation.

THE POPULATION OF HUNGARY.—The publication, under the auspices of the Hungarian Statistical Bureau, of the census reports which were gathered in 1890-91, shows the population of the lands belonging to the Hungarian crown to have been at the close of 1890 17,349,398, an increase of nearly 8,000,000 in the period of one hundred years, and of 1,700,000 in the last ten years. Of this number the Magyars comprise 7,426,730 souls, and the Germans 2,107,577, while the remainder is made up, in the order of numbers, of Croats and Serbs, Roumanians, Slovaks, Ruthenians, and Slovenians, besides some 220,000 of which no classification appears. It would seem that more than one-half of the population can neither read nor write, the greatest offenders in this direction being the Ruthenians, 87 per cent. of whom belong to the analphabetical category. In the region west of the meridian which marks the lower course of the Theiss, nearly all over six years of age can both read and write.

FATHER HUC AND HIS NARRATIVE.—The doubts which have for a long time been associated with the accounts given by Father Huc of his remarkable journey across Mongolia and Tibet, and which had been accentuated by the Russian traveler Prjevalski, seem gradually to be losing force. Prince Henry of Orleans, who accompanied Bonvalot into the heart of Asia, has, in a work entitled "*Le Père Huc et ses Critiques*," published an elaborate defense of his countryman, joining sides with Richthofen, Loczy, Bell and Rockhill. It is claimed for Huc, and his associate, Gabet, that some of the officials of L'hassa still remember the advent of the two French missionaries within the walls of the forbidden city.

HOW THE NATIVE POPULATION OF INDIA LIVE.—The last official census of India, which has recently been published under the authority of the Census Commissioners, gives as the total population (1890) of the Indian Empire 289,187,316, or about one-fifth of the population of the entire world, exceeding that of any single country with the exception of China. The increase in the ten years preceding the taking of the census, while not proportionately high, footed up a total of nearly 28,000,000, or more than the population of all England, and but below that of Italy. In an interesting analysis of the work of the Census Commissioner, a reviewer in the *London Geographical Journal* writes: "It is no surprise to students of statistics to learn that after it was decided to restrict the census inquiry to a return of the inhabited houses only, difficulty arose as to the definition of a house. The variety of structure was so great that a precise definition, such as satisfied census authorities in other parts of the world, became an impossibility in India. In the hill tracts one meets with collections of leaf-huts that are here to-day and gone to-morrow. Again, there is a portable arrangement of matting and bamboo that is slung on a donkey by the vagrant classes, though sometimes stationary on the outskirts of a village for months together. Then comes the more stable erection for the cultivator while engaged in watching his crops, and so on to the really permanent abode of the lower grades of village menials, with wattle and daub walls which last for years, and a roofing of thatch or palmyra leaves, renewed, as necessary, before each rainy season. In some parts of India a considerable space is walled in with a thick hedge of thorn or rattan, and the family expands in separate buildings, as the sons marry, but all is considered to be a 'single' house. Pitched roofs, tiled or thatched, are usual in the moister tracts; flat-topped mud or brick buildings are almost universal in the dry plains of the Deccan and Upper India. Climate and the scarcity or plentifulness, as the case may be, of material are the main causes of the diversity of building; while social custom and the relative prevalence of the 'joint' or 'divided' family life amongst the Brahmanic classes often determine the interior construction and arrangement."

EXTINCTION OF THE WHITE RHINOCEROS.—It would seem that this cream-colored variety of the African rhinoceros, which was described by Burchell in the early part of this century as a new species (*Rhinoceros simus*), and by him reported to be abundant about Latakoo, has now become nearly if not quite extinct. The last specimens were shot by Mr. Coryndon in July of the past year, and exhibited only a short time since in the establishment of Mr. Rowland Ward, of London. Mr. Selous, the famous African nimrod, obtained a specimen in Mashona Land about ten years ago, as did likewise his associate, the late Mr. Jameson. This imperfectly known animal was the largest representative of its genus.

THE TEMPERATURE AND HUMIDITY OF WOODS AND THE OPEN.—Dr. Schubert has recently communicated to the Meteorological Society of Berlin the results of a series of observations made to determine the relative temperature and humidity of the wooded and open country. As a mean of twenty-six days' observations he found that the morning temperature of the woods was 0°.08 C. higher than that of the open, while after midday the temperature was reversed in favor of the open by 0°.3. The humidity, on the other hand, both absolute and relative, was at all times greater in the open than in the woods—a condition different from what is held to be the case by probably most persons.

A HIGH MOUNTAIN FLORA.—The loftiest extended region of vegetation that has yet been explored lies between two and three hundred miles north of the main chain of the Himalayas, along the route that was followed a short time since by Captain Bower, in his memorable journey across Tibet from Leh to China. The botanical results of this expedition have recently been elaborated by the English botanist Hemsley, and they furnish some interesting points in connection with the altitudinal distribution of plants. For a period of five months the exploring party traveled at elevations exceeding 15,000 feet, during the greater part of which neither bush nor tree was visible. The most elevated point from which a flowering plant, a species of *Saussurea*, was obtained was 5750 metres (or 18,860 feet), considered by Hemsley to mark the highest position of any known phanerogam; but Schlagintweit, forty years before, had placed this limit on the Gunshaukar Peak (lat. 31° 23'), nearly four hundred feet higher, at 19,237 feet.

Captain Bower's collections comprise 5 species of flowering plants collected between elevations of 18,000 and 19,000 feet, 57 species between 17,000 and 18,000, 35 between 16,000 and 17,000, and 14 between 15,000 and 16,000 feet. The most abundantly represented genera of these great elevations were *Astragalus*, *Oxytropis*, *Ranunculus* (crow-foot), *Gentiana* (gentian), and the composite *Saussurea* already mentioned, whose loftiest member (*S. tridactyla*) was yet a respectable plant, measuring six inches, and well protected by a thick "wooly" coat. As regards color-relation, by far the most numerous—representing at least one-fourth of all the species—were the red flowers, which, in turn, were followed by the yellow (25 species), the white (15), and the blue (13), a succession, depending upon a large receipt of highly luminous atmosphere, which agrees well with the observations of Bonnier and Bennett made upon the colors of the flowers of the high Alps. The tree which claims the honor of being the most elevated of any on the earth's surface is a *Myricaria*, obtained from an altitude of 17,320 feet, or from a level but little below the absolute ice-crest of Popocatepetl.

THE DEFORESTATION OF THE BRITISH ISLES AND THEIR WOOD SUPPLY.—The question of restoring to the British Isles a portion of their lost forests is being actively agitated, both in scientific and official circles, and not unlikely some affirmative action will be taken toward stocking certain of the waste lands with trees. The total British woodland to-day is comprised within 3,000,000 acres, or within an area standing in relation to the actual area of the country of 39 to 1000. This ratio of woodland to non-woodland is lower than in almost every other country in Europe, as is shown by the accompanying tabulation, where the acreage of forest lands is computed to the value of 1000 acres of actual area: Austria-Hungary, 343; Russia, 342; Germany, 257; Sweden and Norway, 250; France, 159; Italy, 145; Belgium, 143; Holland, 72; Denmark, 60; British Isles, 39. It is estimated that in addition to £3,000,000 worth of teak, mahogany and tropical woods generally, Great Britain imports annually oak, ash, pine, etc., to the value of £12,000,000, an amount which it is thought could be entirely wiped out by afforesting 6,000,000 acres of what is to-day waste land. Dr. Schlich has made the interesting calculation that if this area were planted at the rate of 300,000 acres a year, steady yearly employment would be given to some 15,000 laborers, and that eventually 100,000 people would find continuous service.

HONOR RECOGNITION TO GEOGRAPHERS.—The Royal Geographical Society of London has this year conferred its Founder's medal upon Captain H. Bower, for his remarkable journey across Tibet, and the Patron's or Victoria medal upon Mr. Elisée Reclus, for services rendered to geography through the publication of his monumental *Nouvelle Géographie Universelle*, which, in its nineteenth volume, has just been brought to a state of completion, after an almost continuous labor of twenty years. Mr. Justin Winsor was elected an honorary corresponding member.

A NOONDAY SIESTA.
(Photographed in the Jungle.)

Around the World.

VOL. I. JULY-AUGUST, 1894. Nos. VIII-IX.

AMERICAN LAKE SCENERY.

A TOO enthusiastic nature frequently compares the scenery of the American lakes with that of the lakes of Switzerland or North Italy ; indeed, a feeling of national pride has at times so far overridden the bounds of sober judgment as to have declared that our waters are more than the equal in picturesque quality of any on the continent of Europe. There are, however, few honest minds that will countenance this comparison. Lovely as are the American lakes in all that the word implies, they are, after all, but the impress of a mild nature as compared with the Titanic grandeur which surrounds Como, Maggiore, Geneva or Lucerne, or their representatives in Salzburg and Bavaria. It is rather in the lake region of northern England, where the gentle flowing landscape and soft woodland replace the rugged contours of mountains clad in perpetual snow, that we must search for the analogues of the American lakes. But here the advantage lies clearly with our own waters. The mountains surrounding them, although never partaking of a truly Alpine character, are nobler in their proportions, and usually of a more varied covering ; the autumn glories of the American forest are almost entirely wanting in England, and thus there is lacking that special charm which is implanted in the "red woods" of September and October.

The east-American lakes, barring the Great Lakes of the St. Lawrence basin, while they may be broadly differentiated into the two groups of forest-plain and mountain lakes, represented respectively by the greater number of the lakes of Maine and those of the inner knot of the Adirondacks, have, by reason of a certain sameness in the physiographic conditions which shaped their existence, a largely uniform character. With few exceptions they are all situated below the 2000 foot level, and they are all found north of the line (the terminal moraine) which delimits the southern extension of the ice in the Glacial Period ; in the Adirondacks the greater number are placed between 1500 and 1900 feet elevation. In but few instances, therefore, do the encircling mountains rise more than 3000 feet above the water's surface. Lago Maggiore, which receives the full reflection of the snowy wall of the St. Gotthard and Pennine Alps of 12–13,000 feet elevation, is elevated but 790 feet above the waters of the Mediterranean. The Dent du Midi of the Bernese Alps looms up a colossal buttress 9000 feet above the eastern end of the Lake of Geneva.

One of the most elevated of our eastern lakes is the diminutive "Tear of the Clouds" (4320 feet), on the southern face of Mt. Marcy, in the Adirondacks, which is the highest source of the Hudson River. Its position recalls the *Meeraugen* which lie scattered about the Carpathian Mountains at elevations of 6–7000 feet. Among the thousands of lakes which dot the wilderness between New Brunswick and the heart of New York, Lake Placid, implanted among the primeval forests, and at the base of some of the loftiest summits of the Adirondack Mountains, can justly lay claim to being the most beautiful and picturesque sheet of water east of the Mississippi River. Less pretentious as a lake than Lake George, it surpasses this justly admired water through its own compactness, through the noble character of the surrounding mountains and the luxuriant freshness of the encircling vegetation. Within twelve or thirteen miles of its border are clustered, plainly in view, nearly all the more important summits of the Adirondack chain, and on the northeast White Face Mountain, 4870 feet, approaches within two and a half miles.

If the statement has been made that the American lakes are less grand and picturesque than their European representatives, a partial exception must be made in favor of one or two sheets of water of the Pacific slope, or within the region of the Sierra Nevada Mountains. Lake Tahoe, on the borders of Nevada and California, is preeminently an Alpine lake. Although placed at the very great elevation of 6700 feet, or 400 feet above the summit of Mt. Washington, it yet remains enveloped by lofty and majestic mountains, the Sierra Nevada here rising considerably above the snowline. In thus reflecting the images of snowclad mountains, in the savage wildness of its surroundings, and the surpassing purity and transparency of its almost ice-cold waters, Lake Tahoe is justly entitled to a comparison with the Swiss lakes, even if it does not, perhaps, altogether rise to the magnificence of those waters. The as yet little frequented mountain lakes of Alberta, such as Lakes Louise and Agnes (the latter 8000 feet in elevation), are also gems of Switzerland transplanted on American soil.

TRAVELING IN INDIA.

A REMINISCENCE OF INDIAN TRAVEL.

CHARLES J. GILLIS.

YESTERDAY, January 21st, at noon, we left Agra, passing over the river by a fine iron bridge, from which we had another view of the beautiful Tâj, which was lovely beyond expression. We had an English compartment car to ourselves, and were very comfortable. Highly cultivated fields and frequent great barren plains, with now and then an elephant, were to be seen, and once a long caravan of camels. Monkeys were in the woods, and flocks of parrots flying about, and often the beautiful peacocks were perched on the fences or wandering about the fields.

It will be remembered that the Hindoos consider all animal and bird life sacred, and never kill them, and consequently we see them everywhere.

We passed on at the rate of about twenty miles an hour, having forty-three carriages and over a thousand passengers, mostly natives, and stopped at a station at 1 P. M. for lunch. The stations in India are all large, this one being more than a thousand feet long, and there were collected in it more than a thousand pilgrims bound for the sacred Ganges with their bags and bedding. Among the handsomely dressed women was a bride, who had a profusion of silver orna-

PHOT. W. H. RAU.

LAKE LOUISE.—ALBERTA.

ments in her nose and ears and on her arms and toes. My appearance among this party seemed to entertain them very much, judging by their looks and their chattering.

I went to them accompanied by the native guide, and saw that many of them carried painted poles, from the top of each of which was suspended a bag containing the ashes and bones of some relative, which they had brought from their far-off homes, and were taking to the Ganges to throw into the sacred river.

We passed through great fields of the castor-oil plant, cotton and mustard, and at 9 P. M. rolled into the big station at Delhi, and were soon at the hotel enjoying the comforts of a wood fire.

This is the most dreadful climate I know of—eighty to ninety degrees during the day and down to sixty degrees at night. The hotels have rooms only on the ground floor, which is paved with stone, and anything but comfortable.

Taking a drive, I saw monkeys running along the walls, and was everywhere beset by a great lot of beggars, dancing girls and merchants wanting to sell shawls, jewelry and many other articles.

We have been here several days, constantly driving about and seeing magnificent palaces, tombs and mosques. In one of the great marble palaces is a large hall in which was erected the famous Peacock Throne in the year 1638. The following account of it is given by Tavernier, who, in the seventeenth century, traveled extensively in the east, and saw all the wonders that he relates :

"The largest throne, which is set up in the hall of the first court, is in form like one of our field-beds, six feet long and four broad. The cushion at the back is round like a bolster ; the cushions on the sides are flat. I counted about a hundred and eight pale rubies in collets about this throne, the least whereof weighed a hundred carats; but there are some that weigh 200. Emeralds I counted about one hundred and sixty, that weighed threescore, some thirty, carats. The under part of the canopy is all embroidered with pearls and diamonds, with a fringe of pearls round about. Upon the top of the canopy, which is made like an arch with four panes, stands a peacock with his tail spread, consisting all of sapphires and other proper colored stones ; the body is of beaten gold enchased with several jewels, and a great ruby upon his breast at which hangs a pearl that weighs fifty carats. On each side of the peacock stand two nosegays as high as the bird, consisting of several sorts of flowers, all of beaten gold enameled. When the king seats himself upon the throne, there is a transparent jewel with a diamond appendant, of eighty or ninety carats, encompassed with rubies and emeralds, so hung that it is always in his eye. The twelve pillars also that uphold the canopy are set with rows of fair pearl, round and of an excellent water, that weigh from six to ten carats apiece. At the distance of four feet, upon each side of the throne, are placed two parasols or umbrellas, the handles whereof are about eight feet high, covered with diamonds ; the parasols themselves are of crimson velvet, embroidered and stringed with pearls.

"This is the famous throne which Tamerlane began and Shah Jahan finished, which is really reported to have cost a hundred and sixty million five hundred thousand livres of our money [$32,100,000]."

The beautiful cashmere shawls are made in the province north of here, and are mostly sold in this city, where there are many storehouses filled with them. It is said that it takes the labor of two men a year to make one of these shawls of moderate size.

Wishing to purchase, I went to one of the largest establishments accompanied by three friends. The merchant showed me a book in which were written recommendations of his goods by Gen. U. S. Grant and Col. Fred. Grant, and among them was one written in German, which was translated by my friend from Vienna as follows : "I have bought shawls of this man, and think I got them cheap, but do not offer him a third of what he asks." We spent much time looking at a great variety of the shawls, and finally, aided by the excellent taste of my friends, I selected two, which I thought very beautiful, and asked the price. The merchant consulted two or three of his sharp, bright-eyed clerks in their own language and said :

"I have not sold a shawl to your party ; I sell you very, very cheap ; you may have those beautiful shawls for 1400 rupees." Having in mind the German gentleman's remarks, I said : "No ; the price is absurd ; let us go," and we started out. Then the merchant followed, saying : "Don't go ; make me an offer ;" and I said : "I will give you 400 rupees for both shawls." Greatly to my astonishment he replied : "Take them ; I will send to your hotel." Fearing a substitution or some other trick, I said : "No, hand them to me, if you please. Here are 100 rupees, and you may come to the hotel and get the balance." To this he agreed and the purchase was made.

Our party arrived at Jeypore on the 23d instant, and permission was obtained from the Rajah, who has the reputation of being the most enlightened ruler in India, to visit his palaces and grounds; and very magnificent we found them. The palace was very large, and fitted up in a costly manner. We were admitted everywhere, except to a big building occupied by his three hundred wives. We visited the tiger cages, a dozen of them, each containing a savage fellow. We then went to the stables and saw 400 blooded horses from all parts of the world. The custodian in charge of the stable said that if I wanted to hunt tigers the Rajah would be pleased to loan me a horse, and I would be sure to find a tiger from two to six miles from the city wall. The Rajah was good enough to loan us four of his biggest elephants, and in the afternoon we sent them outside the city wall with a photographer. We followed in a carriage and had photographs taken, and afterward mounted the elephants, four on each, and rode two miles farther to a country palace of the Rajah, and to the ruins of an ancient city, where were formerly great castles, reminding one of Germany and the Rhine. We spent an hour looking over the castle, which is very costly and splendid. On the road and around the palace we were amused by the antics of numerous monkeys and the beauty of flocks of peacocks running wild all over, the screaming of parrots, etc. We then mounted our elephants to return. The one I was on looked as large as Jumbo. Meanwhile my friend, Mr. Jackson, of Manchester, who is a great walker and dislikes the motion of the elephant, had ten minutes before started to walk to the carriages, a distance of two miles. He had nearly reached them when he met a lady and gentleman, who proved to be an English doctor and his wife. They bowed and said: "Good day," but had not passed on ten paces before they came running back. The doctor took hold of Jackson and said: "Look on top of the wall!" (a stone wall laid in cement, five feet high). "And so you went within two yards of yonder tiger!" Jackson looked and saw the big head and paws of a large tiger resting on top of the wall, and then he ran away toward the carriages. Meanwhile, Mr. Kolish, who was on the elephant ahead, had seen the tiger in the field, and shouted to me to look at him, but he went away very quickly, and I saw nothing but a movement in the brush. All this took place before we knew Mr. Jackson had seen the beast. There were six natives with each elephant, and they were much excited and said the tiger must be very hungry, as one seldom came so near the city, and he would most likely get a kid or a man before morning.

I have been more interested in this city, where I have seen only native faces, than in any other in India, and would be glad to spend some weeks here.

The main avenues are one hundred feet wide, lighted by gas, and having water supplied by pumping-works. They are lined with beautiful public and private buildings, and crowded with traffic, numerous caravans of camels coming and going loaded with stone, cotton-bales and all kinds of goods.

We are comfortably lodged in a hotel called a bungalow, which is owned by the Rajah and conducted by a native. I was amused at one of the printed notices in the dining-room, which was: "If visitors are not satisfied with the food or cooking, they can deduct from the bill what they consider fair;" an excellent notice, which I recommend for adoption by hotels elsewhere. In another hotel I saw the following: "Guests are requested not to strike the servants;" and "Guests wishing ice are requested to give a day's notice, and name how much they require."

A SPA IN THE PYRENEES.

DR. BURNEY YEO, a competent authority on the spas of Europe, and one who by personal experience could claim to a most thorough knowledge of his subject, has given it as his opinion that no European spa can compare in natural beauty with Luchon (or the Bagnères de Luchon, as the place is officially known), situated on the northern face of the Pyrenees. Placed at the entrance to one of the finest of the valleys of the region, and almost under the shadow of the storm-beaten

A Spa in the Pyrenees.

OVER THE ROOFS OF EAUX-BONNES.

THE GORGE OF CAUTERETS.

Pic de Nethou or Maladetta, the monarch of the entire mountain-wall which separates France from Spain, it could not well be otherwise than a "gem among gems." In common, however, with the other Pyrenean waters or baths, lying, as they do, off the beaten avenues of travel, this one, despite its magnificent surroundings, does not command that full share of the tourist's attention which elsewhere is bestowed upon subjects much less worthy of mark. France and England, it is true, send yet a large contingent to this sunny south, but it is the resident and *habitué* of summer resorts generally, rather than the passing traveler, who makes up the annual thousands—a circumstance for which, perhaps, the Pyreneans have reason to be thankful. A close observer, commenting upon this neglect of one of the most delightful and favored regions of Europe, attributes it in part to a reputation which it bears "for expense and rackety gayety." The waters are mainly sulphurous and chalybeate, with a strong thermal accentuation.

While perhaps in just possession of the title of Pearl of the Pyrenees, Luchon is not without close competitors in its field of beauty. Count Henry Russell thus depicts the view from Perpigna, in the vicinage of Pau: "Just under you, and all lower than yourself, so as not to hide anything, a hundred graceful hills are seen undulating like the undecided waves of a tormented sea, and covered with lawns, woods, and vineyards, with white villas scattered in every direction like flakes of snow. Beyond all that, walling the whole of the southern horizon, 120 miles of snowy peaks stand up, like a long army of gigantic and frozen divinities; but though so cold above, they seem to smoke below, in the blaze of the sun, as if they stood in the tropics; and just under the snow line they are blue as the ocean."

We illustrate in our pages the central square, surrounded by the principal *Établissements*, of Eaux Bonnes, and the *Thermes du Sud* of the wild valley of Cauterets—both from the region of Pau-Luchon.

THE SNOW-FALL ON MOUNTAINS.

THE quantity of snow-fall accumulating on a mountain-summit will depend upon the degree of moisture of the region, and upon the height to which the mountain rises within or above the cloud-line. Observations made in the Alps, and extending over a considerable number of years, indicate that the maximum precipitation in the form of snow takes place in what is known as the "lower snow-region," or between 6500 feet and 8000 feet elevation. The quantity here, according to Heim, is from 50 to 60 per cent. of the entire annual precipitation, and, as freshly-fallen snow, would form a deposit some 50 to 70 feet in thickness. Its equivalent in the form of compacted *firn*-ice would be a layer of from 7 to 9 feet thickness. Beyond an elevation of 8000 feet the precipitation sensibly diminishes, and we gradually rise into an almost cloudless area, or into a region where the clouds are but thinly scattered and fleecy. Dollfuss-Ausset has shown that on the Théodule Pass, at an elevation of less than 11,000 feet, the total precipitation from November 11, 1865, to May 22, 1866, formed a layer—it is true of already partially compacted snow—of not more than eight feet thickness.

This sudden decrease in precipitation would seem to indicate, as Humboldt long since suggested, that were the Alps to rise to a height double their actual elevation the precipitation on the topmost summits would be practically *nil*, while the summits themselves would be destitute of a snow-covering. It is, in the nature of things, impossible either to prove or to disprove the absolute correctness of this view, but the rapid disappearance of the snows during certain winters, and the laying bare of many mountain-peaks that are normally deeply buried—seemingly so, at least—beneath a snow-cap, argue strongly in its favor. At the same time, it should be noted, with reference to the observations made on the Théodule Pass, that probably many of the more elevated mountain-regions receive their heaviest snow-deposit during the summer months (instead of the winter), when the clouds, also more highly charged during this season of the year, ascend to the highest level before they are deprived of their vapor. The vastly diminished snow-fall that has been observed during the winter months in the high northern regions, and the low position of the cloud-line, seem likewise to point to the conclusion that the snow- and ice-caps of the lofty Greenland mountains, whose crests and summits rise to 9000 and 10,000 feet, or even considerably more, must be principally the result of summer- rather than of winter-accumulation.

Many attempts have been made to determine the thickness of the snow-cap (ice-cap) covering some of the more elevated of the Alpine summits, but the difficulties of obtaining a true section have greatly interfered with the solution of this interesting question. The fact that during certain years the Alps have been largely denuded of their snows, presenting either bare summits, or the distinct configuration of their rock-masses, has been assumed to indicate that the general thickness cannot be very great; but this inference is, in a measure, negatived by actual measurements that have been made on different peaks. De Saussure estimated the thickness of the cap on the Dôme du Goûter at about 50 feet, and of that of the peak of Mont Blanc at upward of 150 feet. But these thicknesses are insignificant in comparison with those which Heim and Simon determined, on actual faces, for several other peaks and crests. Thus, on the Piz Bernina, the ice-wall, at an elevation of about 10,800 feet, was found to have a thickness of some 350 feet, and of nearly 200 feet at an altitude of 13,000 feet. A fracture of the Jungfrau ice, east of the Schneehorn, and at a height of 10,200 feet, showed very nearly 300 feet, while a thickness of upward of 200 feet was obtained at much the same elevation on the crest between the Great Eiger and the Little Eiger.

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THE YELLOWSTONE PARK.*

PROF. DAVID STARR JORDAN.

It happened a long time ago, it may be 50,000 years in round numbers, or it may have been twice as many, that a strange thing took place in the heart of the Great Mountains. It was in the middle of the Pliocene Epoch, a long, dull time that seemed as if it would never come to an end. There was then on the east side of the Great Divide a deep, rocky basin surrounded by high walls of granite gashed to the base by the wash of many streams. In this basin, we know not how—for the records all are burned or buried—the crust of the earth was broken, and a great outflow of melted lava surged up from below. This was no ordinary eruption, but a mighty outbreak of the earth's imprisoned forces. The steady stream of lava filled the whole mountain basin and ran out over its sides, covering the country all around so deeply that it has never been seen since. More than 4000 square miles of land lay buried under melted rock. No one can tell how deep the lava is, for no one has ever seen the bottom. Within its bed are deep clefts whose ragged walls descend to the depth of 1200 feet, and yet give no glimpse of the granite below, while at their side are mountains of lava whose crags tower a mile above the bottom of the ravines.

At last, after many years or centuries—time does not count for much in these Tertiary days—the flow of melted lava ceased. Its surface cooled, leaving a high, uneven plain, black and desolate, a hard, cold crust over a fiery and smoldering interior. About the crater lay great ropes and rolls of the slowly hardening lava, looking like knots and tangles of gigantic reptiles of some horrible extinct sort. There were neither grass nor trees, no life of any sort. Nothing could grow in the coarse, black stone. The rivers and brooks had long since vanished in steam, the fishes were all dead and the birds had flown away. The whole region wore the desolation of death.

But to let land go to waste is no part of Mother Nature's plan. So even this far-off corner of her domain was made ready for settlement. In the winter she sifted snow on the cold black plain, and in the summer the snow melted into a multitude of brooks and springs. The brooks gradually wore paths and furrows down the large bed, and the sands which they washed from one place they piled up in another. The winds blew the seeds of grasses about, and willows and aspens crept up the mountain-sides. Then came the squirrels, scattering the nuts of the pine. Other seeds came, too, in other ways, till at last the barren hillside was no longer barren.

The brooks ran over the surface of the crust undisturbed by the fires within, and were clear and cold as mountain brooks should be; but the rain and melted snow will never all remain on the surface. Some of it falls into cracks or joints or porous places in the rock, and from this come underground streams or springs. But in this region a stream could not run long underground without coming in contact with the old still-burning fires. When a crust is formed over the lava it cools very slowly. When the crust is a rod or two deep, the lava within is almost as well protected as if it were at the centre of the earth.

Whenever the water came down into the fire, the hot rocks would be furious with indignation, and tearing the water to atoms they would throw it back to the surface as steam. Then the explosive force of the steam would in turn tear up the rocks, making still larger the hole through which the water came. When the rocks were very hot, a little water upon them would make a terrible commotion like the shock of an earthquake. When much water came down, it would hiss and boil high in the air, as it tried to break the cushion of steam which came between it and the lava.

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*From a lecture delivered before the Geographical Society of California.

And all this went on in hundreds of places and maybe for thousands of years. The hot rocks glowed and sweltered in the ground, and the cold snow-water crept after them closer and closer, while more and more vigorously the rocks resented the intrusion. Sometimes the water would go down in a mass through a cleft, when it would be hurled back bodily the very way it came. At other times the water came down little by little, insinuating itself into many places at once. Then the hot rocks threw it back in many little honeycomb channels, and by the spreading of these channels the rocks were at last crumbled to pieces. The hard black lava or the glass-like obsidian were changed to white kaolin as soft and powdery as chalk. And as the water fought its way, gaining a little every year, steadily working between the joints in the enemy's armor and as surely being thrown back with violence if it penetrated too far, the animals and the plants followed in the wake of the water, and took possession of the territory as fast as it was won.

At last the Pliocene times were over, for all times come to an end. The one sure thing on the earth is the certainty of change. With the change of time came on the earth's great winter. The snow-drifts on the lava were piled up mountain-high, but ice gathered in little fragments which will grow solid under pressure. As the snow accumulated it began to move, forming great rivers of ice which ran down the courses of the streams. And as these slowly-moving, gigantic ice-rivers tore away huge blocks of lava and pushed them down the mountain-sides, where the rocks had been softened by the action of steam, the ice wore out deep valleys, and everything that it touched was smoothed and polished. The winter of the great Ice Age lasted a very long time, many thousands of years; but long as it was and long ago, it came at last to an end—not to a full stop, of course, for even now some of its snow still lingers on the highest peaks that surround the lava-beds.

Then the winters grew shorter and the summers longer. The south winds blew and the ice melted away, first from the plain and then from the mountains. The water ran down the sides of the lava-bed, cutting deep gorges or cañons, so deep that the sun can hardly see the bottom. And into the joints and clefts of the rocks more and more water went, to be hurled back with greater and greater violence, for all the waters of all the snow cannot put out a mile deep of fire.

In the old depressions where the ice had chiseled away the softer rocks there were formed lakes of the standing water, and one of these was more than thirty miles long, winding in and out among the mountain-ridges. In the lake bottom the water soaked through down to the hot lava below, from which it was thrown boiling back to the surface again—fountains of scalding water in the icy lake.

The cold Ice Age had killed all the plants in the region; it had driven off the animals that could be driven, and had then buried the rest. But when the snow was gone the creatures all came back again. Grass and meadow-flowers of a hundred kinds came up from the valley below. The willow and the aspen took their places again by the brookside, and the red fir and the mountain pine covered the hills with their sombre green. The birds came back. The wild goose swam and screamed, and the winter wren caroled his bright song—loudest when there seemed least cause for rejoicing. The beaver cut his timber and patiently worked at his dams. The thriftless porcupine destroyed a tree for every morning meal. The gray jay, the "camp-robber," followed the Indians about in the hope that some forgotten piece of meat or of boiled root might fall to his share; while the buffalo, the bear and the elk each carried on his affairs in his own way, as did a host of lesser animals, all of whom rejoiced when this snow-bound region was at last open for settlement. Time went on. The water and the fire were every day in mortal struggle and always, when the water was thrown back repulsed, it renewed the contest as vigorously as before. The fire retreated, leaving great stretches of land to its enemy, that it might concentrate its strength where its strength was greatest. And the water steadily gained, for the great ocean ever lay behind it. So for century after century they wrestled with each other, the water, the fire, the snow, the animals and the plants. But the fishes that had once lived in the mountain torrents were no longer there. They had been boiled and frozen, and in one way or another destroyed or driven away. Now they could not get back. Every stream had its cañon, and in each cañon was a waterfall so high that no trout could leap up. Although they used to try it every day, not one ever succeeded.

So it went on. A great many things happened in other parts of the world. America had been discovered and the colonies were feeling their way towards the Pacific Ocean. And in the vanguard was the famous expedition of Lewis and Clark, which went overland to the mouth of the river Columbia. John Colter was a hunter in this expedition, and by some chance he went across the mountains on the old trail of the Nez Percés Indians, which leads across the Divide from the Missouri waters to those of the Columbia. When he came back from the Nez Percés trail he told most wonderful tales of what he had seen at the head of the Missouri. There were cataracts of scalding water, which shot straight up into the air ; there were blue ponds hot enough to boil fish ; there were springs that came up snorting and steaming, and which would turn trees into stone ; the woods were full of holes, from which issued streams of sulphur ; there were cañons of untold depth, with walls of ashes full of holes which let off steam like a locomotive, and there were springs which looked peaceful enough, but which at times would burst like a bomb.

In short, every one laughed at Colter and his yarns, and this place where all lies were true was familiarly known as "Colter's Hell." But for once John Colter told the truth, and the truth could not easily be exaggerated. But no one believed him. When others who afterwards followed him over the Nez Percés trail told the same stories, people said they had been up to "Colter's Hell" and had learned to lie.

But, as time passed, other men told what they had seen, until, in 1870, a sort of official survey was made under the lead of Washburne and Doane. This party got the general bearings of the regions, named many of the mountains and found so much of interest that the next year Dr. Hayden, the United States geologist, sent out a party for systematic exploration. The Hayden party came up from Colorado on horseback, through dense and tangled forests, across mountain torrents, and over craggy peaks. The story of this expedition has been most charmingly told by its youngest member, another John Coulter. Professor Coulter was the botanist of the survey, and he won the first of his many laurels on this expedition. In 1872, acting on Hayden's report, Congress took the matter in hand and set apart this whole region as a "public park or pleasuring ground for the benefit and enjoyment of the people," and such it remains to this day, under the name of "Yellowstone Park."

But, while only of late this region has had a public history, the long-forgotten years between the Glacial Period and the expedition of Lewis and Clark, were not without interest in the history of the trout. For all these years the fishes have been trying to mount the waterfalls in order to ascend to the plateau above. Year after year as the spawning-time came on they leaped against the falls of the Gardiner, the Gibbon and the Firehole Rivers, but only to fall back impotent in the pools at their bases. But the mightiest cataract of all, the great falls of the Yellowstone, they finally conquered, and in this way it was done : not by the trout of the Yellowstone River, but by their brothers on the other side of the Divide. These followed up the Columbia to the headwaters of the Snake River, its great tributary, past the beautiful Heart Lake, and then on to the stream now called Pacific Creek, which rises on the very crest of the Divide. In the space between this stream, which flows west to help form the Snake River, and a smaller stream now called Atlantic Creek, flowing down the east slope of the Divide, the great chain of the Rocky Mountains shrinks to a narrow plateau of damp meadow, not a fourth of a mile in width ; and some years, when the snows are heavy and melt late in the spring, this whole region is covered with standing water. The trout had bided their time until they found it so, and now they were ready for action. Before the water was drained they had crossed the Divide and were descending on the Atlantic side toward the Yellowstone Lake. As the days went by, this colony of bold trout spirits grew and multiplied and filled the waters of the great clear lake, where their descendants remain to this day. And no other fishes—not the chub, nor the sucker, nor the whitefish, nor the minnow, nor the blob—had ever climbed Pacific Creek. None of them were able to follow where the trout had gone, and none of them have ever been seen in the Yellowstone Lake. What the trout had done in this lake—their victories and defeats, their struggles with the bears and pelicans, and

HELL'S HALF ACRE.—YELLOWSTONE NATIONAL PARK.

with the terrible worm, joint enemy of trout and pelicans alike—must be left for another story.

So the trout climbed the Yellowstone Falls by way of the back staircase. For all we know, they have gone down it on the other side. And in a similar way, by stealing over from Blacktail Deer Creek, they overcame the Undine Falls in Lava Creek, and passed its steep obsidian walls, which not all the fishes in the world could climb.

NOTES ON THE MAPS OF THE WHITE AND ADIRONDACK MOUNTAINS.

THESE two regions are now so generally known that a detailed description of them would properly be considered superfluous. As parts of some of the most ancient land-mass of the American continent, they have long held a prominent position in the eye of the geologist, contributing in their history largely to the controversies which have been waged around the making of the Archæan tract and the development of first-formed sediments. Their granites, schists, and syenites have long been a friendly topic with the geological student, and even if they have not yet fully disclosed their histories, they are on that account none the less interesting. It is, however, in their scenic, rather than constructive, relations that they are so endeared to the American people, and with justice it can be said that they present types of scenery which are in a measure unique, or at least difficult to find elsewhere. The combination of mountain, forest, and lake, such as we find it in the Adirondacks, with the impress over it of an as yet wild and untamed nature, does not see its like either on the American continent or in Europe.

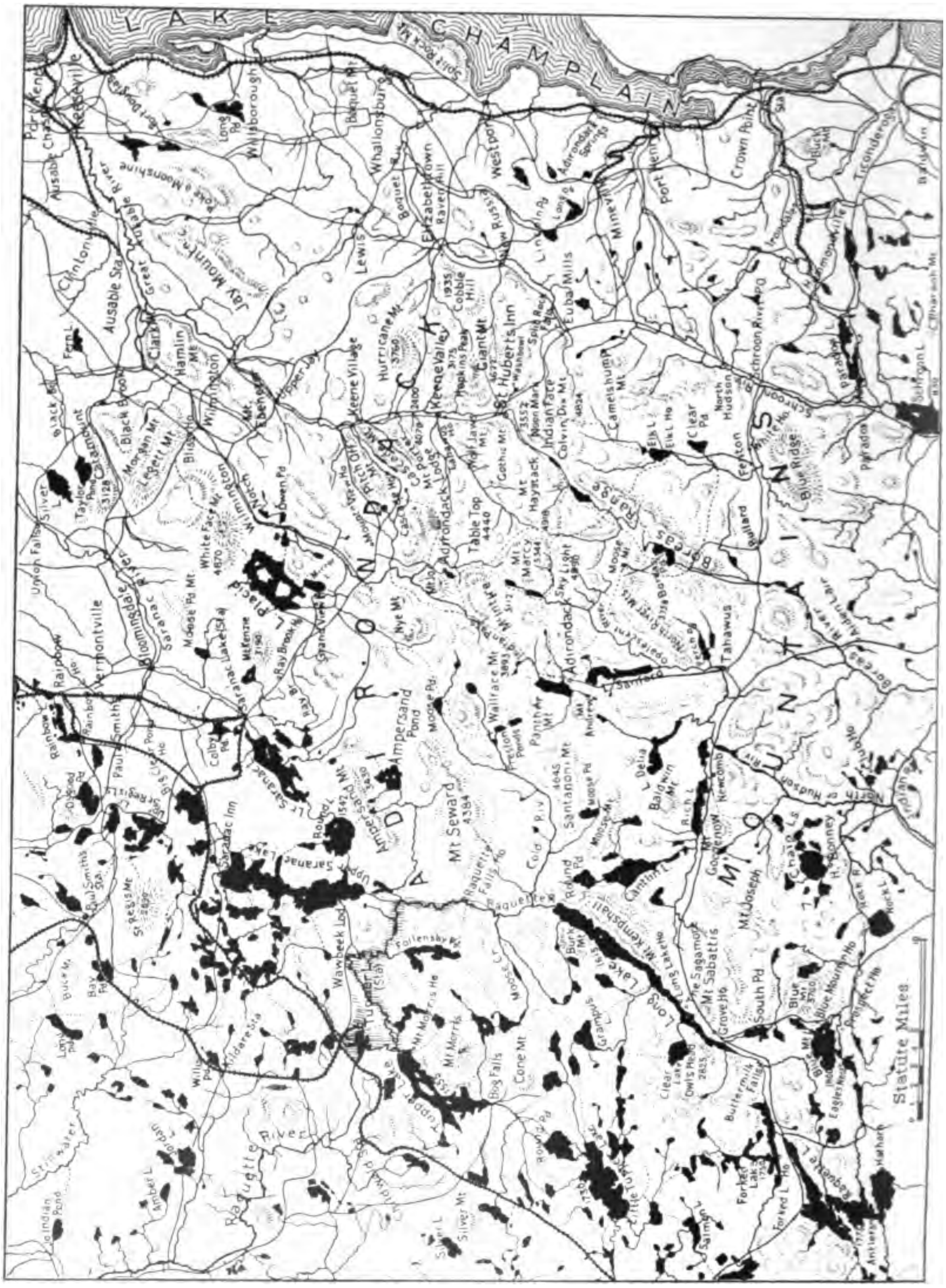
The Adirondack wilderness, in its broadest sense, covers an area of some 12,000–13,000 square miles, the greater part of which is yet in the condition as it was known to its earliest visitor—a primeval forest, largely unbroken and but little explored. In it are buried hundreds of lakes, perhaps a full thousand or more, above which rise numerous mountain peaks, clustered and knotted in almost indefinable confusion. A broad parallelism of contour can be traced in a general northeast and southwest direction, but a distinct high axis locating the principal peaks, such as we find in the Presidential Range of the White Mountains, or in the subordinated Franconia Mountains, does not exist, or at least is not so clearly marked out as to make it a determining feature in the mountain landscape. More properly this system is made up of a number of more or less parallel broken ridges, several of which carry elevations of nearly equal altitude.

Principal Elevations.—The culminating point of the Adirondacks is Mount Marcy or Tahawus, the "sky-splitter," with an elevation of 5344 feet, or somewhat exceeding a mile. Other principal summits are :

Mount McIntyre	5112	feet
" Haystack (near Tahawus)	4918	"
Gray Peak	4902	"
Skylight	4890	"
White Face	4870	"
Dix Mountain	4842	"
Santanoni Mountain	4645	"
Giant Mountain	4622	"
Mount Seward	4384	"
Wallface Mountain	3892	"
Blue Mountain	3760	"
Ampersand Mountain	3430	"

The greater elevations are nearly all bunched about the head-waters of the Hudson and Ausable Rivers, and form the water-parting for the streams that are thrown off to the St. Lawrence, the Hudson and Lake Champlain. A wildly rugged nature has invested some of the peaks, but, as in the Catskills and the White Mountains, there are none which properly aspire to the dignity of *aiguilles* or *Hörner;* indeed, rising as they largely do from basal elevations considerably exceeding 1000 feet, their apparent or "mountain" height does not much exceed that of the considerably lower outer peaks of the Catskills.

Lakes.—The distinctive feature of the Adirondack Mountain tract is constituted by the almost endless series of its lakes, which measure all sizes, from a few acres to fifteen or twenty square miles. A large number of these occupy nearly equal elevations, and are linked to one another by a vast system of interlocking or communicating water-passages. Long Lake has a length of twenty miles, and Schroon Lake, if still considered to properly lie within the region, about fifteen miles ; the latter is in



MAP OF THE ADIRONDACK WILDERNESS.

areal extent the largest of the entire series. The elevations above the sea of the better-known waters are approximately as follows :

Schroon Lake.	830	feet
Lower Saranac Lake	1540	“
Tupper “	1555	“
Upper Saranac “	1575	“
Long “	1615	“
St. Regis “	1620	“
Raquette “	1775	“
Blue Mountain “	1800	“
Lake Placid.	1860	“
Lake Henderson	1875	“
Upper Ausable Lake.	1990	“
Lake Colden	2770	“
Avalanche Lake.	2855	“

The small mountain tarn "Tear of the Clouds," situated on the Col between Mount Marcy and Skylight, at an elevation of 4320 feet, is the highest source of the Hudson River, and with the exception of the "Lakes of the Clouds," placed on the slope of Mount Monroe, in the Presidential Range, at a height of 5050 feet, perhaps the most elevated permanent lake east of the Rocky Mountains.

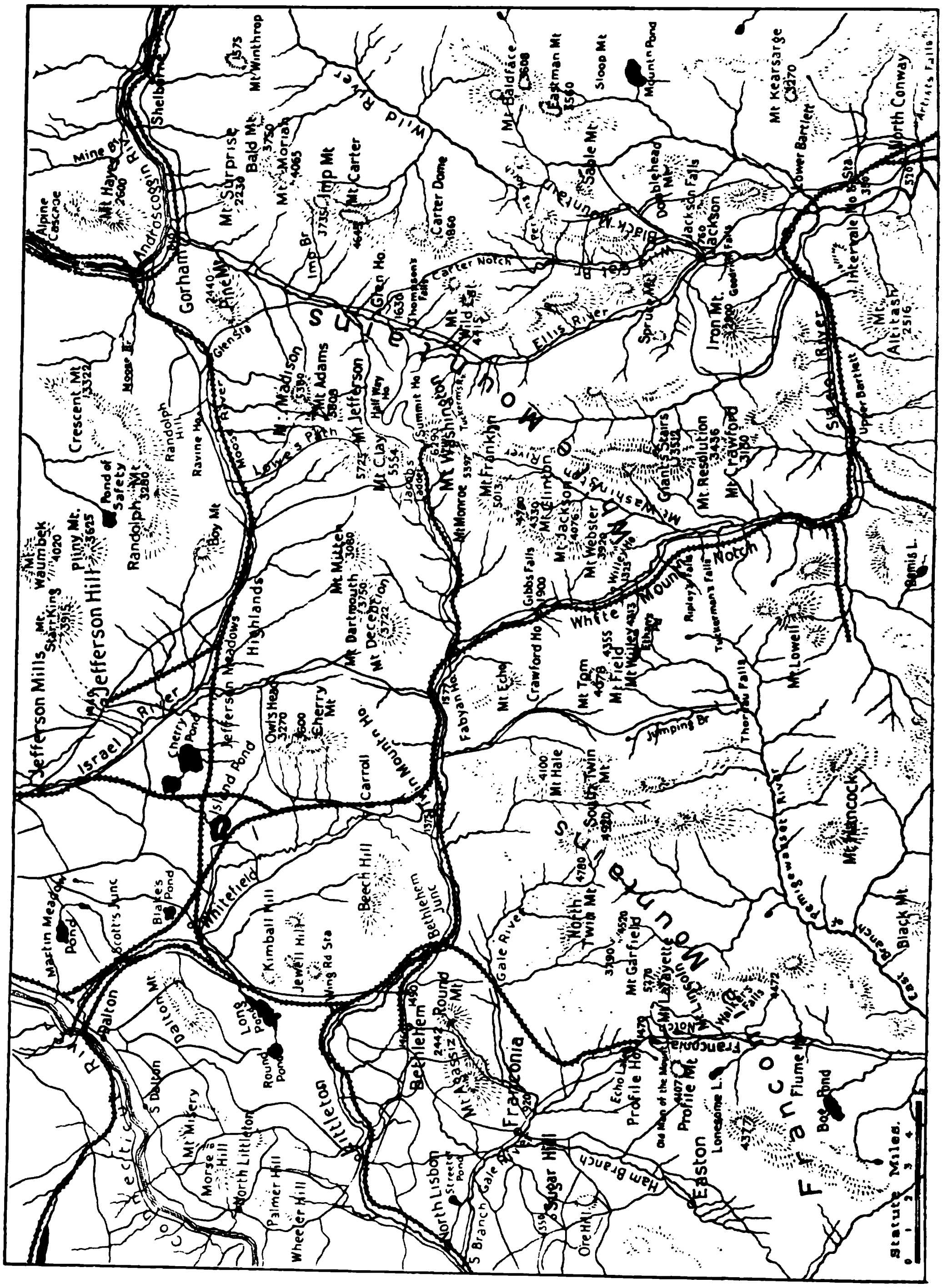
THE INDIAN PASS.—The deep ravine which passes northeastward between Wallface Mountain on the west and Mount McIntyre on the east, and holds some of the headwaters of the Hudson and Ausable so close to one another as to at times unite them, is beyond comparison the grandest and most imposing single scenic feature which the Adirondacks present. The rock wall of Wallface, which rises sheer to a height of 1300 feet and narrowly closes in the landscape on one side, has been described as one of the grandest cliffs of the New World.

THE WHITE MOUNTAINS.—Perhaps the most striking feature which distinguishes the "Granite Hills" of New Hampshire from the Adirondacks is their comparative freedom from lakes. And yet, if any direct relation exists between the working power of glaciers and the fashioning of lake-basins, we have in the White Mountains a region of past glaciation seemingly fully equal in its possibilities to that of northern New York. Not improbably, however, the majority of the forest-lakes of New York, like the forest-lakes of Maine, are not rock-hollow basins, and represent simple surface undulations, which may or may not stand in principal relation to the materials of deposit which were distributed by the glaciers that at one time occupied the region. As very generally defined the White Mountains embrace not only the eastern, or Presidential range of mountains, but also the Franconia Mountains on the southwest, and with them cover an extent of some 1300 square miles, or somewhat more than the area of Rhode Island. They rise from a general plateau-surface of some 1500–1600 feet elevation, and thus present a full exposure, in the loftier summits, of from 4000 to 4500 feet. Deep ravines or "notches," the correspondents in form, although not in structure, of the "cloves" of the Catskills, break into the mountains at different points, and afford impressive views of the work of mountain-destruction that has for ages been ceaselessly going on. The better known of these are the Crawford or White Mountain Notch and Tuckerman's Ravine, the latter of which is a close competitor in grandeur of scenery with the Indian Pass of the Adirondacks.

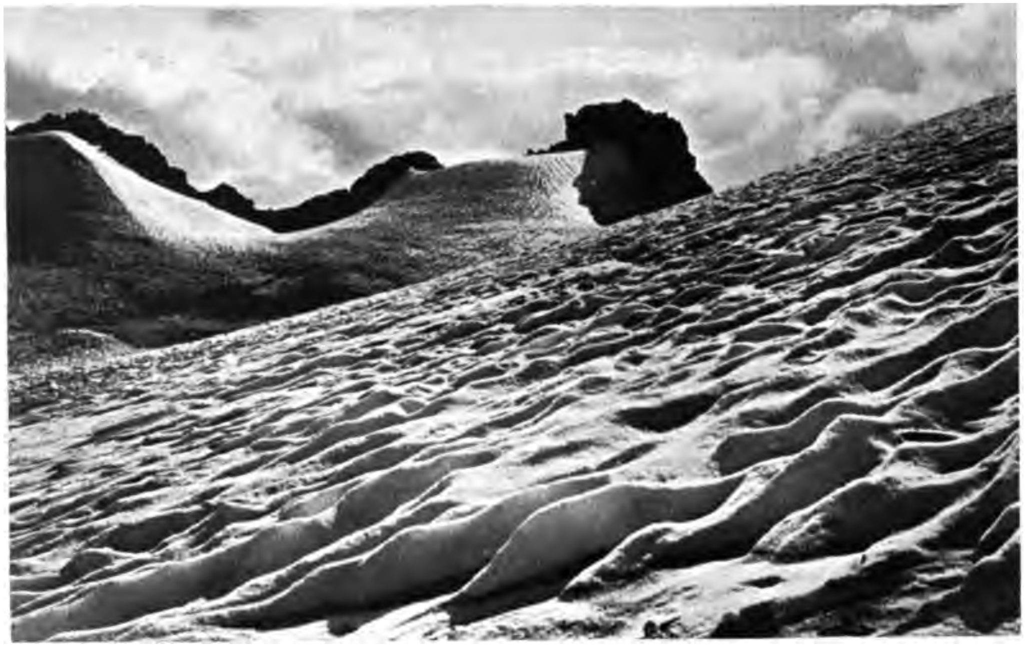
PRINCIPAL ELEVATIONS.—The most accurate determinations of altitude for Mount Washington, the highest point of the system, give to it 6293 feet, or nearly 400 feet more than the Rigi. For a long time this mountain held undisputed claim to being the most elevated summit east of the Rocky Mountains, but this position has been usurped by at least twenty peaks in the western part of the State of North Carolina. Among the more prominent peaks following Mount Washington are :

Mount Adams	5808 (5819)	feet.
“ Jefferson	5725 (5736)	“
“ Clay	5554	“
“ Monroe	5397	“
“ Madison	5380	“
“ Lafayette (Franconia)	5270	“
“ Lincoln “	5098	“
“ Franklin	5013	“
South Twin Mtn. (Franconia)	4920	“
North Twin “ “	4780	“
Mount Garfield, or Haystack	4520	“
‘ Liberty (Franconia)	4472	“
“ Wild Cat	4415	“
“ Clinton	4330	“
“ Willey	4313	“
“ Jackson	4076	“
“ Webster	3920	“
“ Starr King	3915	“

THE VIEW FROM MOUNT WASHINGTON.—The view from this summit is probably the most extensive offered by any mountain peak east of the Rocky Mountains. No careful determination of the prospect from some of the higher tops of the North Carolina mountains has yet been made, and not impossibly a more distant reach may be commanded by one or more peaks, but it is nearly certain that the expanse of view covered by them is considerably more



MAP OF THE WHITE MOUNTAINS.



PHOT. F. H. CHAPIN.

HALLETT GLACIER.—COLORADO.

limited. In the first and second volumes of "Appalachia," Professor Pickering enumerates the more salient points visible from Mount Washington, which, at their farthest distances from the peak, are: Mount Greylock, southwest, 147 miles—the most elevated point of Massachusetts, 3505 feet; Mount Belœil, near Montreal, northwest, 153 miles (perhaps only doubtfully visible); Whiteface Mountain, in the Adirondacks (4900 feet), west, 130 miles; Mount Wachusett, west of south, 126 miles; Mount Monadnock, west of south, 104 miles; the Killington Peaks (near Rutland), 88 miles; Ebene Mountain, N. 50° E., 135 miles—the most distant positively determined point; the Isles of Shoals, 96 miles; the city of Portland, 67 miles. Mount Katahdin, in the heart of the Maine wilderness, 163 miles distant, is frequently pointed out as a visible point, but the determinations of Professor Pickering make it almost certain that it is covered by Mount Abraham. At the same time it has been asserted by those who have climbed Katahdin that, under exceptionally favorable conditions, the White Mountains are clearly discernible from the summit. With regard to Greylock, it would also appear that it is non-visible, being closed out by a little-known peak, Haystack, some thirty miles nearer to Mount Washington, whose crest (3464 feet) is seemingly only forty feet less elevated than that of Greylock. Haystack is in fact the mountain which is pointed out as Greylock.

The following recommendations by Professor Pickering will be appreciated by the tourist:

"For the benefit of those unfamiliar with such matters, it may be noted that sunrise is the best time to observe the eastern, and sunset the western horizon; and that during the middle of the day, which is the time usually selected by tourists, very little can be seen that is more than sixty miles distant. June is the best time to be on the mountain, and September the next. To make sure of a clear afternoon and evening, wait till after a heavy storm. If this clears off at sunset, the higher peaks are pretty sure to be clouded the next morning, and then is the time to start, for the clouds will disperse in the afternoon, and give a fine sunset."

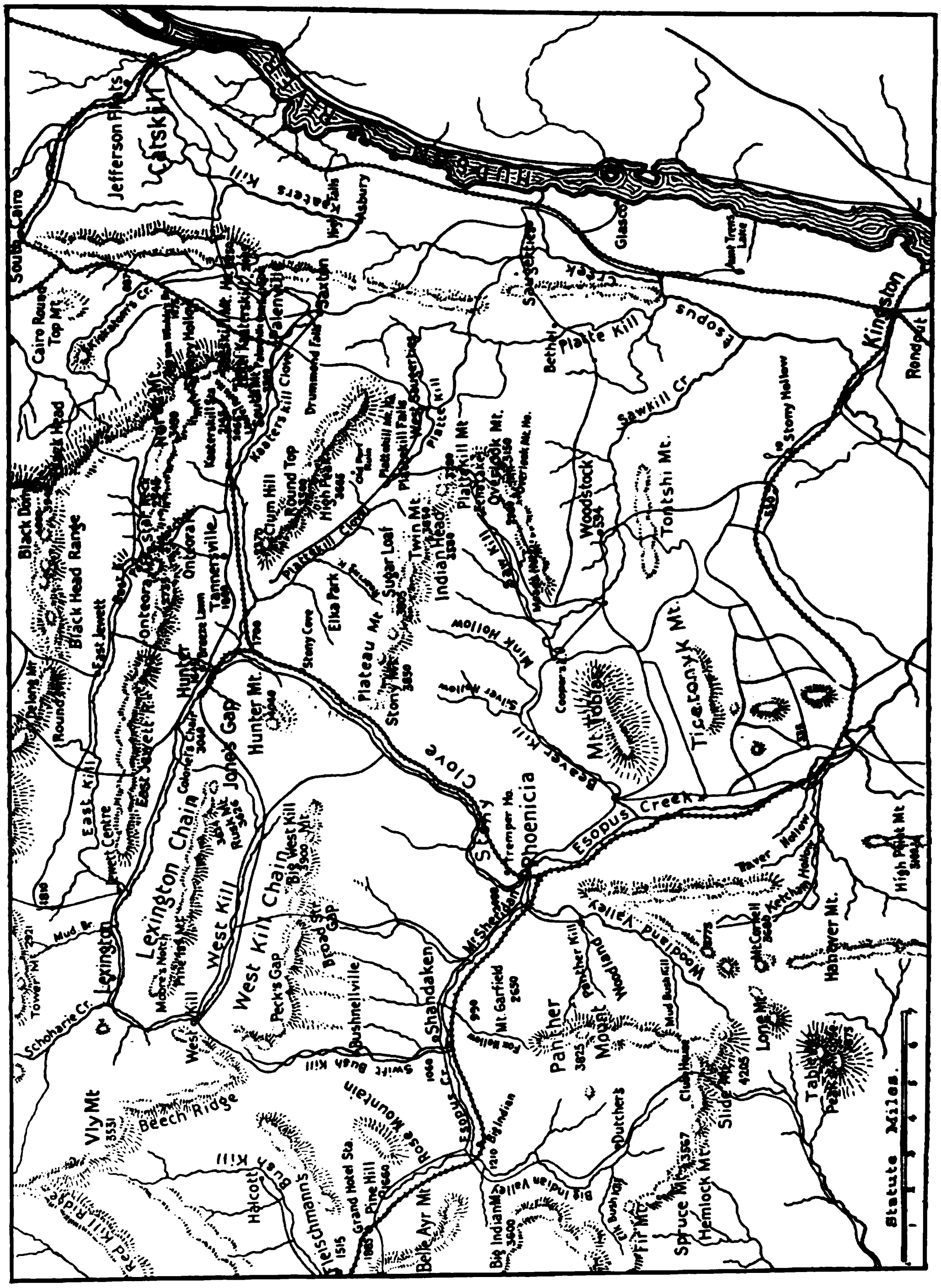
It should be observed that the meteorological conditions presented by the summit of Mount Washington are such as to place them on the extreme of variation of any position in the United States. Probably the lowest degree of cold registered within the national domain was marked at the summit signal station, reported at —60° F.

THE WORK OF GLACIERS.

THE EDITOR.

THERE is hardly a topic connected with the physics of the earth that has been so persistently brought to the attention of geologists as that of glaciers and their work. Ever since Louis Agassiz, with a genial inspiration, promulgated his famous "glacial theory," ascribing to moving sheets of ice the special features of the surface of a large portion of the northern hemisphere, this topic has been a favored one in the long line of discussion problems; no other, probably, has given rise to greater controversy, none which has so completely divided the camp of the geologists. Time has not softened the acrimony of earlier discussion, nor seemingly has the line of argument changed materially during the period of the last twenty or twenty-five years. Most geologists to-day accept without reservation the presence in a comparatively recent period, in regions where glaciers are no longer to be met with, of vast and more or less confluent ice-sheets of a glacial character, but they are by no means agreed as to the origin of the ice, the period of time, counted by thousands of years, that it had its maximum development, and the character of the work that was performed by it. So far as opinion on the last-named branch of glacial physics is concerned, geologists may be conveniently divided into the three classes of the positivists, the negationists, and the middle-ground men, or those who ascribe to moving ice an almost resistless working power, those who virtually deny to it all power, and those who cautiously withhold final expression of opinion until the evidence in the case has become firmer.

What is the work of glaciers? In old-time works on geology we were told that glaciers transport a vast amount of detrital material—boulders, angular blocks of rock, etc.—in the form of a moving "drift," polish and gently shape exposed rock surfaces, and groove these with the characteristic glacial striæ. A modest force was made responsible for only a modest amount of result, and the makers of the science felt satisfied that even this little was definitely known. Gradually the open and flat-floored glacial valleys, with their staggering walls



The Otis Elevating Railroad connects the Palenville Branch with the Eastern Crest of the Mountains.

MAP OF THE CATSKILL MOUNTAINS

of broken and disintegrated rock, were placed to the credit of the eroding power of moving ice, and finally, when Ramsay and Tyndall, backed by the influence of a directorship of a nation's geological survey and an almost unrivaled brilliancy of scientific diction, ventured the conviction that even the hollows of the larger rock (lake) basins were the result of glacial action, it was considered that the science of geology had scored a point. The dictum of the geologists and physicists, who, with one luminous inspiration, found the key to the problem of the Swiss lakes, soon found its echo in the western world, and the Great Lakes of the north had yielded their secret to the ever-inquiring mind.

The criticism is but too freely made that geological facts require too frequent revision—that the teachings of one decade are, in great part, no longer the teachings of the decade following. Unfortunately, this criticism carries with it a certain amount of truthful sting—the prick of conscience that plainly informs the seeker after truth that no "fact" should be heralded as a fact until it is known to be such by an overwhelming amount of evidence. Suppositions and beliefs all have their value, are, whether right or wrong, necessary for the furtherance of any branch of investigation or study, but they should not be made to do duty as truths on half-evidence. It is seemingly this form of evidence which is responsible for the present differences of opinion regarding a question which patient and unprejudiced investigation ought readily to solve ; but the solution can only be found in the field, by study at the side of the ice, above it, and below it. Neither deduction nor rhetoric can more than doubtfully supply an actual deficiency in knowledge, no matter how cogent or brilliant the line of argument may be.

The evidence of to-day indisputably proves that glaciers are an active force, that they wear and tear the land-surface with effect. The particular form of rock-modeling which is found in glaciated regions, and is absent from others, sufficiently proves this. as does likewise the special form of mountain-valley which is so distinctive a feature of many glacial countries. The broadly-open contours and flat bottom are familiar to all who have critically examined the physiographic details of such countries. Manifestly the erosion which a glacier exercises, working, as it does, with more or less equality throughout its entire extent, and protecting the work being performed through the presence of its own mass, must necessarily be of a kind different from that of water ; hence it is distinctive and recognizable. Yet this form of valley is sometimes more apparent than real, and were the glacier and the material that it has carried down with it to be swept from its floor, the valley-contours would be little different from those carved out by water.

It may be admitted, then, that destructive work is being performed by the glacier, but the question as to how much still remains unanswered. It has often been remarked that glaciers preferably circumvent rock-masses protruding in their path to carrying them away, being seemingly incapable of leveling their beds, and that on a level they will frequently ride over loose objects, such as gravel and pebbles, without materially disturbing them in their positions. The writer has had occasion to notice this negative peculiarity, even in the case of some of the large ice-sheets which descend from the Greenland ice-cap. The smiling meadow-land, which frequently rises in the path of a departing glacier, is conclusive evidence that in its own case the work of excavation has been practically *nil*, and this form of evidence is only too frequent to be permitted to pass with that easy satisfaction with which the glacial positivists receive the free criticisms of their opponents. It is, in fact, a kind of evidence which can only be met by that form of logic which differentiates for or against itself, as the particular occasion demands. If some glaciers are not powerful agents of destruction, others are or may be.

What or where are the facts which support the second condition ? Where is the direct evidence of that force in a glacier which permits it to be used as an excavator of large lake-basins ? It can hardly be said that any such exists, for, while it is true that certain rock-bound lake-basins are so placed in relation to the positions of existing or past glaciers as to make it appear that they were formed by them, other basins in the same region hold a very different relation. Again, the seemingly all-significant fact that has so frequently been appealed to that by far the greater number of the lakes of the world are located in regions of glaciation, past or present, carries no weight with it, except in so far as it represents a likelihood or a coincidence. A very large proportion of the northern lakes are not contained in rock-basins at all, and others are paralleled by the lakes of non-glaciated regions. Thus, the equatorial lakes of Africa may be taken as the representatives of the Great Lakes of America, the lakes of Tibet as the representatives of the lakes of northern Russia. It is significant, too, that the mountain tract, the Himalayas, which to-day harbors the largest glaciers, is much more deficient in lakes than the region immediately to the north of it, and the deficiency is still much more marked in the Caucasus.

We should, however, be cautious in denying too much to the action of the ice. Manifestly the kinds of facts that are presented to us are not such as to make a solution of the question of work a very easy one, at all events not one that can be obtained from the study of the glaciers of but a single region. There are possibilities which may be entirely beyond the boundaries of the knowledge that has so far been obtained. Still, with all limitations and exceptions, the actual observance of facts must be given due weight Mr. Douglas Freshfield, whose extensive personal acquaintance with the glaciers of Europe leads him to conclude that glaciers are conservative rather than destructive in their action—protecting their beds or channels from atmospheric influences—thus emphatically sums up his experiences : " Burnishing I have found glaciers often ; scraping or pushing back soft protuberances in their path, sometimes ; but scooping or excavating, never." The writer's observations among the glaciers of Greenland lead him to believe that their excavating power is measurably great, sufficient to carve out fjords and valleys over a steep mountain course, but insufficient to hollow out rock-basins of any but a most insignificant extent from regions of level position ; and he is by no means convinced that the fashioning of the fjord is not primarily dependent upon a disintegration of the rock-masses independent largely of the work of the glacier itself.

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TREE-FORMS AS DETERMINED BY WATER SUPPLY.

PROF. W. P. WILSON.

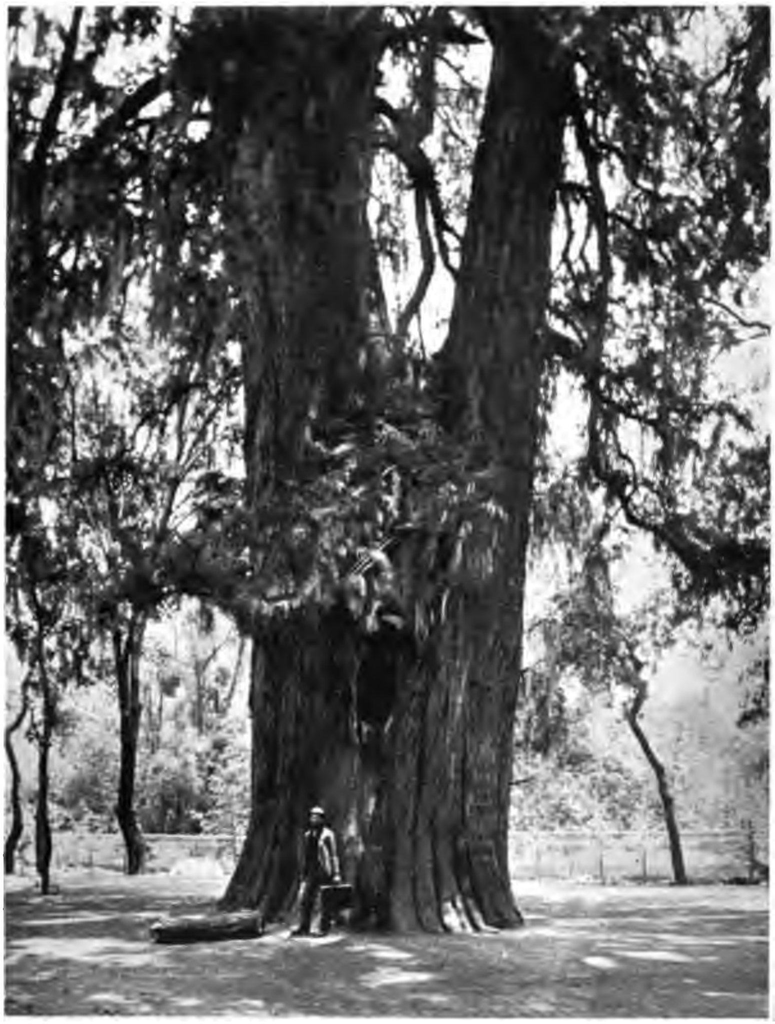
THE very interesting observations made by Professor Wilson upon water-supply as a determinant of vegetable form finds a beautiful expression in the habits of the bald cypress, the common tree of the southern cypress swamps. This is described in a lecture delivered at the Marine Biological Laboratory of Wood's Holl, from which, with the permission of the author, we extract the following :

If you open your eyes and look carefully about, as you are traveling from place to place, you will easily see that there are very many differences between the plants of one region and those of another. In the high mountains you will find many thick-leaved plants, such as the rhododendrons and sedums, and quite a number of peculiar forms not seen lower down. Many of these may have a stunted, gnarly or dwarfed look, quite strange to the vegetation at the sea-level. In still another region the plants may have lost much of their natural grace and beauty of form. They may look rigid and stiff, with small, thickened leaves or none, with short thickened stems, or round and consolidated forms, such as we find in the cacti or euphorbias. These are the tenants of desert regions.

Again, if you happen to go south into the tropics, sheltered and shaded by immense thin-leaved trees, with the waving green of the palm and the vine, you will find dense masses and banks of dark green foliage belonging to ferns and selaginellas, with climbing plants of various kinds intermingled.

About your own door may be quite as interesting forms as in more remote districts, only you are accustomed to them and do not see their peculiarities. You may look out on pines and oaks, on a great diversity of small plants, with the Indian pipe, a partial parasite, and a few ferns which can bear more wind and cold than most of their relatives, plenty of mosses and lichens, and, in fact, representatives of all the great plant families.

The ancients looked upon the whole animate world as having been directly created by some higher power, and believed that each species indicated a distinct and individual creation. They also observed these differences between the plants of different regions, and, in fact, between those of the same region. They thought that all living organisms were created to fit the special location and conditions under which they existed. They believed that water animals and water plants, for example, had always been and would always remain such ; that the desert region had always been a desert region, and that the cactus had been created to fit it. At present all naturalists believe not only in the possibility of a continual change in both plants and animals, to fit them for varying conditions, but also in



THE MONTEZUMA CYPRESS.—CHAPULTEPEC.

the gradual growth and development of very diverse changes in climates, rendering equal modifications in both fauna and flora absolutely essential to their continued existence. Since great changes have always been slowly taking place in the earth's surface and climate, and since present vegetation has always been subject to these gradually varying conditions, it must have adapted itself, with a slowness commensurate with the earth's changes, to the ever-appearing new conditions. In this way, we think, can be solved the problem of the infinite variety of vegetation.

BALD CYPRESS —JAMES RIVER, VA.

By experiment we may determine the two factors underlying plant variation. On the one hand the laws of inheritance are ever holding the plant invariable, while the external forces are ever pushing it toward variation. In this lecture we will disregard entirely the interesting phenomena which relate to that internal force, the manifestations of which we call inheritance, and try to discover how much the plant world is moulded and shaped by what is exterior to it.

If you are inclined to think about all these differences in the vegetation of the many regions through which you have traveled, you will soon see that where there is great change in the appearance of the plants, in passing from one place to another, there is also an equally marked difference in the surroundings or soil or climate. You will soon find yourself always looking for the one when you have found an expression of the other, *i. e.*, if the plants give you a new flora, you seek at once to find the cause in external conditions; or, if you have great external difference in surroundings and climate, you expect this to be at once reflected in the varying vegetation about you.

The bald cypress (*Taxodium distichum*) grew in the present Arctic region before the Glacial Epoch, in company with oaks, maples, willows, the redwoods (*Sequoia gigantea*, *S. sempervirens*), the gingko tree (*Salisburia adiantifolia*), torreya and glyptostrobus. During later changes in climate these trees were driven from their home and traveled down widely different lines into the south. For reasons which we are unable to understand, the sequoia, or redwood, descended along the California coast, the glyptostrobus and the salisburia or gingko tree, down the coasts of China and Japan, the torreya and taxodium, or cypress, to the eastern and southern parts of North America. At present the bald cypress grows only along the water-courses and in the swamps of the south-eastern part of the United States. It seeds itself naturally nowhere outside of areas which are for several months during the year under water. This tree belongs to the pine family, but has some very marked peculiarities which make it differ strongly from any of its relatives.

The tree shown in our plate stands normally surrounded by water. Many root-like projections are seen underneath and around the tree, which are popularly known as cypress knees. These are all connected with the root system below the water. They have extended their growth upwards until they are sure to remain in the air at the ordinary level of the water during most of the year. They are in such numbers that wagon-loads of them could be taken away from one tree. From many careful experiments made on the growing seedlings, it has been determined without doubt that these knees are organs of respiration. All dry-land trees secure free oxygen from the soil to carry on the oxidations needed in root growth. This tree growing in water, which holds much less oxygen than the soil, is unable to draw its full supply from the medium surrounding the roots. To fill this want, these knees are pushed up out of the water into the air as aerating organs. Although the plant does not now grow normally on dry land, yet when planted there it thrives as it once did in previous geologic ages in the Arctic regions. Plant two sets of seedlings, the one in dry soil, the other in soil flooded with water: the first will show no signs of the root-aerating organs, while the second will develop them in abundance, as small vertical roots pushed above the surface of the water.

In the water growth, the branches of the cypress are spreading and the top flattened, a marked departure from the most striking characteristic of the pine family, to which it belongs. When grown, however, in dry soil, in our parks and public grounds, it reverts to the normal type. The branches are short and make a sharp angle with the main stem, and its cone like form is as pointed as in any of the tall conifers. It will be observed, too, that there are no signs of knees underneath.

Our figure represents a water form from the James River. The base, in this form, is always very much enlarged. This enlargement is a part of the aerating system needed to secure the necessary oxygen, and is, of course, entirely absent from the land form.

The departure from the sharp, cone-like form natural to the conifers, is due to the difficulty in obtaining both air and food from the water. This lack of nourishment shows itself in the dwindling, depauperate and dying branches of the upper part, since that part is most remote from the food supply.

In some of the lakes of southern Florida it now and then happens that a cypress tree has obtained a foothold in much deeper water than is its normal habit. Here all of these water peculiarities are greatly exaggerated. The trunk of the tree produces an immense cone, the top of which points up to the surface of the water and ends with a few flat sprayey branches. The base of the cone may be forty or fifty times the diameter of the top, from which come the few straggling branches which project above the surface of the water. There are at its base innumerable knees. In a tree having the height of twenty-five or thirty feet, the cone below the water will represent a little over one-half, and the branches above the other half of its altitude. Our cut represents such a tree in south Florida after the waters of the lake had been drained away. The knees, being of no further use, quickly rotted and disappeared. Originally the water was high enough to touch the lower branches, and the tree eked out a miserable existence, struggling hard in the deep water for both air and food. The difficulties under which it labored developed it into a great monstrosity. It is an extreme expression of excessive water supply. Compare its short, cone-like trunk, entirely immersed in water, with what may be called the normal development now found only in our parks. In this form the trunk is tall and slender, with branches towering to a very sharp point. The water form has acquired its knees and greatly enlarged base for purposes of respiration. Its flattened cone is the result of the bad nutrition. The land form, dropping into its native dry earth habitat, does not develop the knees and enlargement, because its oxygen supply is ample. Its nourishment, too, is sufficient, so that it will have as a result of these normal, favorable conditions, the tall, sharp, cone-like form natural to the pine family. Doubtless the cypress has been millions of years adapting itself from its dry-land conditions to its watery surroundings, and the most interesting fact in this connection is its readiness to fall back into its old habit of growth, and even in the first generation on land to lose every trace of these wonderful acquisitions.

There are many other plants which have acquired equally remarkable organs in the same way. Some of the mangroves of the Florida coast, such as *Avicennia nitida* and *Laguncularia racemosa*, growing in the ooze between tide-waters, have developed vertical roots which project out of the mud by hundreds under each tree and are exposed to the air at every low tide. These organs aerate the plant as the knees aerate the cypress. They are much more highly organized, being covered on the parts above the mud with great numbers of large, open lenticels.

It is not necessary for us to go so far from home to find numbers of plants which have adapted themselves, through special aerating organs, to a change from dry land to water growth. One of the most common is *Decodon verticillatus*, which develops over the surface of all its roots an extremely thickened, corky, air-holding layer. A similar development covers the branches when they happen to drop into the water.

Let us now see how plants are modified when they lack water. If the supply is inadequate, the plant makes an attempt to conserve the little that it has. As the surface of ordinary plants allows large quantities of water to escape by transpiration, and as this loss is largely proportioned to the amount of surface exposed, such plants usually lessen this surface by making the leaves smaller and thicker, or by losing them entirely, by shortening the branches and by consolidation generally. As the light and the heat of the sun increase transpiration, the surface of the plant may become, for protective purposes, hairy ; the cuticular and epidermal layers may be thickened ; the interior air passages in the leaf which communicate with the surface may become obliterated through consolidation of the cellular structure ; and, in certain cases, the leaf may have added to it definite kinds of tissue for storing water to be used in time of need.

THE AZORES AS A HEALTH RESORT.

HERMAN CANFIELD, M. D.

OF the many new resorts that are annually being discovered in the interests of the health-seeking patients, few, perhaps, promise more than the small group of volcanic islands which lie some two thousand miles almost due east of the city of Philadelphia, and rise like a gigantic tower from the greater depths of the Atlantic Ocean. Many of the peculiarities of these islands, together with their health-giving properties, are embodied in an address delivered by Dr. Canfield before the Alumni of Bellevue Hospital, from which we abstract the following description of the vapor-valley of Furnas, in the island San Miguel :

Many invalids remain in Ponta del Gada for the winter, deferring their trip to the hot springs to the early spring months. There are always here a number of American and English people. The Portuguese society is hospitable and entertaining. Short excursions may be made to the surrounding towns and other points of interest. The city itself has a good theatre, a large public library and museum, numbers of fine gardens, ancient churches and government buildings, public markets, etc., that afford one means of diversion. This is all well enough in its way, but the invalid, who is thoroughly in earnest about the recovery of his health, will push on to Valle das Furnas without delay.

Comfortable carriages, drawn by three mules abreast, make the trip over the mountains in a day, over a road built and maintained by the government. After ten days' pitching about at sea, to bowl along with a smooth, compact, pumice-stone macadam under wheel, is a delight indeed. Up hills and around the sides of mountains, now down into deep gorges, over bridges spanning roaring streams or rocky gullies; now touching the very sea and catching the dashing spray, then up again 2000 feet; orange groves on every side; bananas, loquots and pine-apples; fruits of our own country and all others; strange trees and trees familiar, and shrubs, flowers, and ferns everywhere!

At last we dash down a narrow gorge and come out on the shore of the lake of the valley of the Furnas. Along its shores, around a high hill, and we drive out upon a promontory, with the village of Furnas at our feet. Away to the right clouds of steam hover over the site of the hot springs; below us runs the Ribeira Quente, the hot river, glinting yellow gold in the sunlight, with its heavily charged iron and sulphur waters flooding the fields of broad-leaved inhams, lost to sight under old mills, then out again among the trees and plantations of stramonium—for a distance of two miles trailing a thin veil of steam over its waters. Below, the quaint village; and beyond the towering peaks of Cafahote, Vara, etc., 3500 feet into the sky.

Accommodations at Furnas are very comfortable, but by no means luxurious. The food is good, but not varied—mostly meats. I have eaten a twelve-course dinner at a Portuguese table and had only one vegetable—boiled potatoes. Chickens, eggs, milk, and all kinds of fruit can be had in abundance.

You will not mee here the difficulty one finds in sending invalids to the Southern States, for the diet question need not be taken into consideration. Water is always good and pure, being conducted in earthen pipes from mountain streams. Wine is good and cheap. The drainage is all natural, and there are seldom closets in the houses.

The springs and the town itself lie in a bowl-shaped valley, the crater of an extinct volcano, or rather a series of volcanoes. Not many feet below the surface the fires are still active, and the springs are simply streams of water heated by the hot gases seeking escape from below through their channels. These superheated gases, passing over beds of different mineral constituents, partake of their character, and deposit in the water they meet with a portion of the same. Where the gases issue from the earth, free from moisture, they deposit about their exits pure sulphur and alum, for the most part. The daily flow of water from these springs is simply enormous, their drainage forming a stream twenty feet wide. The temperature of the different springs ranges from 50° to 212° Fahrenheit. . . . Most of them are heavily charged with carbonic acid gas. The degree of this varies, as does the pressure, some flowing slowly, with very little gas, while others boil fiercely on high, with a roaring of gas, heard at a long distance.

My experience with mineral waters leads me to believe that their therapeutic virtue depends much more upon the way in which nature has mixed the chemical elements than upon the elements themselves. The most provoking part of this is, that it is the manner of the mixing that we know nothing about, while of the elements mixed we have a very fair understanding. A careful chemical analysis has been made of some twenty of the principal springs, but I will not weary you with repeating them. Briefly, some of the springs are alkaline, others strongly acid. All contain sulphur, iron, alum, and silica in varying proportions. Silica is present in some of the waters in surprisingly large quantities, imparting to them a smooth, oily feeling, which renders a bath in them most delightful. Others produce a sharp, stinging sensation, due to the excess of carbonic acid gas; while others draw and pucker the skin, leaving a yellow deposit that deeply stains the towels like iron-rust.

The bath-houses were built by the government a few years ago, and are free to all. Besides these there are a dozen private baths, but the government has stipulated that for each one built, the owner must also build another connecting with the same spring, for the use of the public.

All bath-tubs are cut out of solid stone, marble, sandstone or lava rock. The water from the boiling springs is run in closed pipes into two tanks, the one a cooling

PHOT. W. H. RAU.

THE BEE-HIVE AND MIRROR LAKE.—ALBERTA.

tank, the other receiving a constant stream of the boiling water. The bather mingles the two to suit his pleasure.

Briefly, these waters are efficacious :

First, in rheumatism. Chronic cases, other than those of a rheumatoid arthritic type, always recover, and what is most remarkable is the permanency of the cure ; a number of cases have been reported in which there has been no relapse up to date, a period of ten years or thereabouts. If the waters can be persisted in, ordinary chronic rheumatism seems to be entirely cured. Every case improves.

Second, most cases of paralysis are benefited, especially where there is a rheumatic diathesis present.

Third, syphilitic lesions of all kinds.

Fourth, locomotor ataxia in some cases is greatly benefited, but as a rule the result is disappointing.

Fifth, the Portuguese is "damned with his stomach," of which he is always complaining. To the springs he makes his annual pilgrimage, and there finds sure relief from his dyspepsia and intestinal troubles.

Sixth, skin diseases are for the most part cured, almost always benefited, especially eczema.

Seventh, to my mind this is a perfect heaven for a neurasthenic. My own experience was a very happy one. After a long period of nervous suffering following a severe attack of *la grippe*, I reached the springs January 1st, a complete wreck. In the first thirty days I gained thirty-four pounds, and all the neurasthenic symptoms disappeared in proportion. On January 1st I could not walk a quarter of a mile; January 30th I walked twelve miles without discomfort.

I cannot give you much information about the internal administration of the waters. Every one drinks according to his taste, and I could obtain no directions from any physician upon the island, nor could I find any reports upon the subject. I drank of them all. Some were very nasty, some most delicious, but I could perceive no marked effect from any. Invalids of all classes will do well at any season of the year, except those with weak throats and lungs, and they should not be sent at all. The rheumatics will do better in the summer.

The cases likely to be benefited upon any of the islands, and especially at Furnas, are those suffering from neurasthenia, in all its phases, dyspepsia, and nervous diseases of all kinds, rheumatism, skin diseases, syphilitic and otherwise, and Bright's disease in all its forms.

One word of caution : Do not send a patient alone unless he is full of resources for his own employment and pleasure. There is nothing to interest one after the novelty of the strange country has worn off except the beautiful scenery, the lovely drives and walks. Nature has dealt with the islands with a lavish hand, giving them a climate in which every tree, fruit, flower or vegetable can be grown. She has given them mountains of great height, and plains stretching as far as the eye can reach, covered with a vegetable growth that ever produces wonder and surprise. To a lover of nature these islands are a never ending source of delight, but there is little to interest one who is not. It is a bad place for an inebriate ; or, for one who craves excitement and society. A despondent patient here without a friend would commit suicide in a week. One dependent upon luxuries would be badly off, for most of the life is like camping out.

The expense of the trip is very small. Three hundred dollars will cover all expenses of the passage there and return, and a sojourn of three months. Five hundred dollars will allow one to do it "like a lord."

A sea voyage of twenty days over a southerly course, where the weather is usually warm and the sea smooth; a country full of novelty and interest both as regards its people, their customs, mode of living, and its geological history; its wonders of forest, fruit and vegetable growth; its moist, warm climate, with an average winter temperature of 62° F., and a summer temperature of 72° F.; its soft ocean breezes, lulling to rest the weary brain and soothing worn out nerves, and yet by the force of extreme purity putting life, strength and energy into every part of the body ; its sunshine so grateful to the rheumatic and essential to all sufferers from kidney troubles—all certainly make the region worthy of our study and consideration, and afford me with a sufficient excuse for taxing, as I have, your patience by the length of this paper. And yet I have left many important points untouched, and at the best have only directed your attention to a few of the numerous advantages these islands offer to the invalid, and especially the invalid of moderate means. The time is not far distant when a more scientific knowledge of these islands will be available to the profession, when the means of communication will be improved, and the accommodation there more Americanized; the Azores will then take a high rank among the health resorts of the world.

A SUNDAY ON PIKE'S PEAK.

BUSHROD W. JAMES, M. D.

AS I awoke the first morning that I spent upon the summit of Pike's Peak, there seemed to be around me an awful presence, a something intangible, and yet a mental realization as certainly felt as if I could grasp it; and an almost triumphant wave of anticipation made my heart bound when I realized that the day was the Sabbath and that I was to have the pleasure of spending it upon this most renound peak of the Rocky Mountains. If I, who had attained this wondrous height in a comfortable conveyance, on a road made safe and sure by those who had gone before me, experienced this exultation, what must have been the feelings of him who first made the ascent on foot through hours of arduous labor!

The surface on which I looked appeared as if, ages ago, some mighty race of giants had prepared to build a fortress and had been interrupted in the attempt after having collected the great amount of stone required; or, perchance, they had accomplished their walls and citadel when nature, angry at the desecration, had by a great convulsion destroyed their masonry, leaving many acres of rocks thrown in irregular heaps—a vast ruin to commemorate the daring attempt. In the crevices snowflakes and drifts nestle as if they would fain aid in the repairing of the structure, and hardy lichens make rare mosaic here and there, as they creep over the broken edges and flatten themselves against the rocky surfaces, now tender and green, where the young growth draws moisture from the tiny heaps and lines of snow, now yellow, where the sun rays touch them too warmly, and again, pale, or grayish or green as the winds steal the sap.

I stepped forth eager to begin my tour of observation, and a short walk took me some distance from the old signal station in which I had reposed, far enough to be out of reach of any sound from that direction. The sun had already chased the early morning mist that attempted to hide its favorite from his too fiery gaze, but its jealous guardianship had been unavailing, for all around was sunshine and silence! This was the awful presence that I had felt encompass me while I was arousing from sleep. Silence—grand, majestic, all-pervading silence! It held my senses in thralldom! I was alone with only that for company—alone, in such perfect isolation, that the very power of thought seemed quite to have forsaken me.

I walked apace and the sweet, rare atmosphere, so free from all impurities, made my heart throb and palpitate almost painfully. It was as though my blood must be purified by draughts of the refining air before I entered into the enjoyment of the extended and glorious panorama spread before me, and as if I must receive a sort of baptism to fit me to become a moving, sentient atom in that still world of grandeur. I felt that should I speak my voice would remain with me echoless; for surely no human sound could wake an echo in that apparently limitless space.

I looked toward the east across wild stretches of prairie land, across running streams, winding like serpents or like shining threads through the quiet valleys; over towns dotting the broad expanse of gray and green, like toy villages upon a spacious lawn. Far, far I gazed, as if my vision could span the hundreds of miles between myself and home, home—the one small spot in all this beautiful land to which I should turn when I became satiated with beholding the wonders of the glorious mountain country.

The towns below had upon them a Sunday quiet, the noises from them could never have reached the height upon which I stood, and yet if I had not known by the calendar, I should have been sure that it was the day of rest. I suppose it was the absence of smoke from the furnaces that produced the impression. The glittering water-courses appeared to have hushed their week-day brawling and splashing and to flow gently through the peaceful land; the forests were still, I could not hear the rustle of the foliage, the winds had left them to take a part in the solemn silence. The towering giant peaks around held their peace, leaving me to the coveted thoughts that follow all unbidden.

Here and there man's works peeped forth in tiny patches upon the extended plains, but how frail they were and how they marred the placid beauty of the prairies or broke the grand contour of the mountain sides! The roads planned by human minds, and cut into form by many hands with numberless hours of patient labor, sank into insignificance beside the mountain gorges near at hand below me. These may have been opened by throbs of nature's heart, or perhaps the rivers winding through them have been delving them for ages, with no plan but their own sweet will and no tools but their rippling waters and the angry tempests. Be that as it may, the mountain streams wander on with mighty rocks leaning protectingly over them, hundreds of trees and vines turning toward them their stately trunks or quivering tendrils and the huge mountain shadows, sombre and dark, vying with each other on the restless surfaces of the dancing waters.

I wandered from point to point over the promiscuous heaps of red-colored stone, at every turn receiving fresh views of beauty or magnificence. To the east, Colorado Springs lay far below in a flood of sunlight; it resembled a garden patch, its streets taking the place of the gravel walks which separate the different parterres with geometric precision, the shade trees that grow along the sidewalks, nourished by irrigation, making the resemblance still more complete.

Taking the Hotel Antlers as an objective point, I could distinguish the various avenues and public buildings distinctly, though the city was but a diminutive miniature of itself in the clear distance. There, too, a little to the west, was the original settlement, Colorado City, but in a dim eclipse beside its younger and more beautiful sister. For hundreds of miles spread out to the eastward the broad, flat prairie lands, in some places showing a rich green, but mostly of a rather sombre grayish hue, partly on account of the sage brush that grows abundantly all over the western plains, and partly on account of the drought that exists there at this season of the year. I could distinguish nothing upon the surface of the "plains" except the dim tracery of the river courses, and more than likely that slowly moving speck or object in the distance was the smoke of a locomotive instead of some great-winged bird flying toward the distant orient, whose plane grew softer and less distinct in the mellowing haze, until all was lost in a horizon of tender smoky blue.

A little more toward the north lay Manitou, that centre of so many wonderful and beautiful points of curiosity, given to man as nature's object-lessons. Sheltered by the surrounding mountains and foothills, its streets turning this way and that to avoid the steep hills or the rugged gorges, the handsome residences built in lovely, picturesque nooks, or on boldly glorious outlooks, yet all carefully guarded from the wild winds by these grand old mountains, or the sloping hills—a place rich in beauty, wealth and health-restoring atmosphere. Looking from my lofty perch it might have been a park, with the graceful summer-houses placed in the most favorable locations for the enjoyment of the gorgeous scenery.

Southward, tiny cultivated areas shone through the trees, or among the rolling hills, but indistinctly, as if they and the adjacent villages were kaleidoscopic pictures. But to the west my eyes turned and lingered. My breath was almost lost in wondering admiration! Mountain after mountain rose in majestic peaks, in frowning cliffs, in overhanging crags, all gray and red and pink, dotted here and there with pine or fir trees, which struggled into existence and kept their hold against wind and storm with stubborn persistence, though their limbs were twisted and their foliage broken, showing the darker shadings of the bitter storms that had dealt with them so rudely. Hill upon hill rose and fell, softening with their undulations and their patches of green the passes between the mountain spurs; and deep, black gorges, rough-hewn cañons, marking dashing water-courses or gigantic disruptions of those mighty mountains, met my eye at every turn; while far, far beyond, I caught glimpses of snow-crowned summits—white, red, pink, and green, broken by great velvety black shadows—glowing, shimmering, melting into fair vistas along the magnificent ranges that reach and spread on and onward toward the valleys and riches of the sunset country!

THE DISAPPEARANCE AND PROTECTION OF THE CHAMOIS.

LOVERS of nature will be pleased to learn that a timely governmental protection to the chamois will in a short time restore to the Alps one of their national ornaments, one which threatened to remain only as a remembrance with those who knew the region in the years that are no more. It is, indeed, difficult to dissociate the Alps from the chamois, but the ravages of the hunter have so far diminished the numbers of these animals that to many a long resident their existence appears more in the nature of a myth than a reality. Who that now visits the Alps would not but gladly recall the picture of the mountains in the days of Conrad Gesner (1516–1565), when the chamois and steinbok still looked proudly down from the heights of the Pilatus upon the placid waters of Lucerne? And even in the "fifties" of the present century a few noble animals could still occasionally be met with along the ice of the Mer-de-Glace of Chamounix. Of the thousands of tourists who to-day flock to the Alps, and scan from far and near the mountain crags in a vain search after the departed, barely one can conscientiously claim to a vision of the reality; only the scarcely less agile mountain-goat appears within the field of view, but, verily, it in itself makes a beautiful picture.

According to an official census made in 1884, it would appear that in that year only about 1085 of these animals remained in the Canton of Bern, 1500 in the Grisons, 900 in Freiburg, 200 in Vaud (and Valais?), 450 in St. Gall, 180 in Appenzell, and still smaller numbers in the remaining cantons. In Glarus only the protected herds of the Kärpfstock remained, and from the mountains of Lucerne all the animals had disappeared. The restrictive or protection period, which in some cantons has been made to cover full eleven months of the year, has had the natural tendency to largely increase the stock, so that at the present time, even with the increased zeal of the chamois hunter, there is no imminent danger of absolute extermination. But the extent of the depredation that still continues can be inferred from the following table of "bags," covering eight years, for the limited period of six weeks within the precincts of a single canton (Grisons): 1884, 1396 head; 1885, 1300; 1886, 1700; 1887, 1363; 1889, 1309; 1890, 1153; 1891, 1558; 1892, 1344. The destruction every year verges closely upon the total number of animals that was assumed for the canton in the year 1884.

The game-laws of Germany and Austria, which have been rigidly enforced for a longer period than in Switzerland, have greatly benefited the chamois, whose home, it might truly be said, is no longer the dizzy heights of the Swiss Alps, but the heights of Upper Bavaria, Salzburg, Tyrol and Carinthia, and the yet largely inaccessible fastnesses of the Carpathian Mountains of Hungary and Galicia. Chamois preserves are now established in Switzerland as well as in Bavaria and the Austrian mountains.

NOTES ON MOUNTAINS AND MOUNTAINEERING.

THE PROJECTED RAILROAD TO THE SUMMIT OF THE JUNGFRAU.—One of the boldest feats of railroad engineering is conceived in the project to reach the summit of the Jungfrau by means of a series of ascending tunnels through the heart of the mountain. The plan of Guyer-Zeller, of Zurich, contemplates a departure from the Scheidegg Pass (Wengernalp), at an elevation of 6756 feet, with a traverse of the Fallbodenhubel to the foot of the Eiger glacier. The road there enters a tunnel, and bores through the Eiger, Mönch, and Jungfrau, emerging on a plate of rock at an elevation of 13,448 feet, or about 200 feet below the actual summit, which it is intended to reach by means of an elevator of the American plan. The total length of the road as here proposed is about 12.5 kilometres, with a length of tunneling of 10,250 metres. The estimated cost of construction is 7,500,000 francs, and cost of maintenance 142,000 francs; as an offset to this amount it is calculated that there will be a revenue of 250,000 francs, derived from the transport of 10,000 tourists to the station Eiger (25 francs a person) and of 280,000 francs from an estimated 7000 who will make the annual pilgrimage all the way to the summit (40 francs).

THE DANGERS OF ALPINISM.—A recent number of the *Rivista Mensile* takes up the defense of Alpinism against the charge that it is an unnecessary and all but useless exposure of body to accident, and cites the fact that in England within a period of three years (1891–93) seventy-one deaths resulted from the innocent and much approved game of foot-ball, with 366 cases added to the list of the more or less severely wounded. The *L'Echo des Alpes*, commenting on this fact, throws out the warning, however, that Alpine disasters are unnecessarily increasing, and much too numerous, six fatal cases being reported from the closing week of the year 1893 alone.

A GIGANTIC MOUNTAIN SLIP.—One of the most stupendous mountain slips of which there is record took place in Sep-

THE CHAMOIS' CALL.

(Photographed from Life.)

tember last, in the Gurhwal district of India, the mass of fallen rock blocking the valley of the Bihri-Ganga with a dam 900 feet in height. Water has been steadily accumulating behind the dam since its first formation, and at last accounts had nearly reached the margin of overflow, thus imminently threatening the lower regions with disastrous floods It is thought that a permanent lake will be formed as the result of the slide.

The Volcanoes of Guatemala.—Dr. Karl Sapper, who is at present associated with the geological service of Mexico, gives, in a recent number of *Globus*, a detailed account of his ascents of the principal volcanoes of the Guatemalan republic. Few of these offer any serious difficulties to the mountaineer, except through the dense and luxuriant vegetation which covers their slopes. Atitlan is largely shrouded in an almost impenetrable primeval forest, and on most of the other peaks the forest rises well up to the line of the crater. Deciduous trees were found on Tucana up to an elevation of about 11,300 feet, passing beyond the conifers full 250 feet. On the summit of Tajumulco, just east of the Mexican boundary, at an elevation of 13,500 feet, only a scanty growth of grass, lichens and moss was found. The restricted vertical range of the trees, as compared with what is found on the Mexican volcanoes, shows that here, as well as in Mexico, the tree or timber-line is determined by other causes than those which are simply associated with climate or temperature. The famous volcano of Agua (12,100 feet), while still retaining its crater, no longer shows any traces of activity.

Tyndall as an Alpinist.—In our biographical notice of the late Professor Tyndall we called attention to two of his principal mountain exploits—the first ascent of the Weisshorn (1861) and the first traverse of the Matterhorn from Breuil to Zermatt (1868). It also appears, from a statement contained in the British *Alpine Journal*, that the distinguished physicist was the first to pass a night on the Mont Blanc (1859). The year previous he ascended the Monte Rosa entirely by himself, with a sandwich and a half bottle of tea as his full store of provisions.

Mount Katahdin. — There are few mountains in the eastern United States which are more worthy of a visit than Mount Katahdin. Rising in almost solitary grandeur from a veritable "sea of forest," and to an elevation but little less than that of the culminating peak of the Adirondacks, it commands a view of surpassing beauty—limitless, one might say, except in so far as an almost all-round horizon defines the ocular power. There are no immediate foothills to break the entirety of the view, and the eye roams over a seemingly endless expanse of forest, lake and river, primitive in its roughness, and only at distant points showing evidences of the encroaches of man upon the wilderness. A clearing here and there, and perhaps the far-off curling of a column of smoke, and we have practically all with which civilization appeals to the eye that is focussed from an elevation of 5300 feet above the ocean level. Nearly seventy lakes, most of them of considerable size, have been counted in a single ocular sweep; but because of such a count one need not agree with Tuckerman that the view resolves itself to a mathematical determination. The vast solitude of almost unbroken forest, with its silver threads ramifying in all directions, is in itself a picture which goes far to wipe out the deficiency of mountain and valley. But Katahdin itself is a noble peak, and when decked with snow, with its base still shrouded in the green of the primeval forest, it is a rival to any of the scenes which belong to the eastern mountains, if, indeed, it does not surpass all. The ascent of the mountain can be accomplished without difficulty, and most readily, perhaps, from the side of the Penobscot West Branch. Its well-marked "slide" suggests the road to the tourist, and over it he will merely have a long and somewhat fatiguing, but in no way dangerous, course. A certain narrowness of the summit *Felsenmeer* makes caution somewhat necessary.

HINTS TO THE TRAVELER AND NOTES ON APPLIANCES OF TRAVEL.

A New Mountain Food.—A peculiar bread compound, known to the Swiss as *pain de aleuronat*, seems destined to usurp the place of many other foods that have heretofore been recommended on long, and especially mountainous, journeys. It has received the endorsement of a number of experienced campers and travelers, and may now be considered to be officially installed.

In a journey lasting fifteen hours, Professor Heim distributed to each of thirty-eight participants, as their only food, one such "bread," weighing 450 grammes, in which were comprised 120 grammes of vegetable albumen, fifty grammes of sweet butter, ten dried prunes and a small allowance of sugar. It appears to have been amply sufficient for the members of his party. The advantages claimed for this particular food are that it combines in a durable and easily transportable form, with a pleasant taste, the essentials of bread and meat; it does not spoil readily, provokes little thirst and costs all but nothing. A day's rations amount to only 60-70 centimes, or about twelve cents, while the weight does not exceed one kilo. It is said that Nansen has abundantly provisioned himself with this material in his Polar journey.

THE NECESSITIES AND REQUIREMENTS OF MOUNTAIN-ICE TRAVEL.—With the advent of the summer season, when, doubtless, a considerable amount of travel over mountain snows and ice will be indulged in, it may not be amiss to emphasize for the benefit of the new hand in such travel some of the special points of precaution that attach to this form of recreation. It may be laid down as a broad axiom that wandering by one's self upon unknown snow or ice-fields is unwise, and generally fool-hardy. Lurking crevasses, unstable snow-bridges and impending avalanches may imperil the wanderer at almost all times in such journey, and unknowingly to him. Therefore, the Swiss habit of banding together is an essential and common-sense one, and one that has been brought into custom through the teachings of dire experience. A route may appear perfectly safe and harmless to the uninitiated or not-practiced eye and yet be dangerous at intervals of perhaps every few yards. It is the invisible danger which has suggested the propriety of roping together—the attempt to check by holding to one another, the disastrous consequences resulting from an unexpected plunge into a pit or crevasse or from a mountain glissade. An ice-party should consist of not less than three, and the more numerous the members the greater, up to a certain point, is its safety. But the inconvenience of traveling in numbers, the inability of some members to keep up with the others, impels frequently to a small number as a matter of choice. When roped together in the traverse of a glacier a distance of a few yards should be allowed to intervene between each member of the party, and the distances that have been decided upon should be rigidly observed, otherwise the neglect of position is likely to be accompanied by general inattention and a non-readiness to meet the shock of a possible mishap. The rope should be securely fastened to the person and not merely held by the hand or passed, without hitch, through an open belt-ring: it should be tested for strength before every long journey and closely scanned for the detection of possible cuts or frails. No ice-field should be attempted without proper foot-gear—*i. e.*, accessories to the ordinary shoe-leather in the form of creepers or well-projecting hob-nails, and these should occupy a both toe and heel position, so that both ascent and descent of an ice-slope may be made more or less secure. Various forms of boot-irons or crampons have been devised, but it is perhaps not easy to indicate those really most desirable; absolute firmness of attachment is necessarily a *sine qua non* of safety. Almost as invaluable and necessary as the proper foot-gear is the alpenstock, the hand-guide, which, if it does not always in itself give security, lends confidence to the step. Its invaluable aid in up- and down-hill work is too well-known and appreciated to require special commendation. Those skilled in the gymnastic art frequently use it as a vaulting pole for the passage of glacial crevasses, but in such use a full knowledge of one's ability to vault should be pre-determined, otherwise the chances for accident are good; but even with the most experienced the practice of crevasse-vaulting is not to be recommended. In the ascent of a steep ice-slope step-cutting has very generally to be resorted to, and for this purpose all Alpine parties should be provided with one or more well-handled axes. These, in fact, are the true alpenstocks of the Swiss mountaineers, and naturally where they can be had no other form of pole is necessary. Experience has taught the Swiss guides that the short-handled (some four and a half feet) axes are for most purposes the most serviceable; many, however, prefer the long handle, which adapts itself more readily to the less-skilled climber. It is essential to have the handles made of hard, well-tested wood, such as hickory, for example, and the blades properly tempered, and secured in such a way as not to weaken the point of insertion, otherwise the instrument will soon show itself to be absolutely worthless. Experienced mountaineers keep well aloof from the brink of a snow-field that covers the top of a mountain, assuming that possibly such field is only an impending "cornice," ready to be precipitated with the ~~addition~~ of new weight to its mass.

The precautions and warnings that have here been given are the more general ones, and those that should be first learned ; each mountain has, however, its own peculiarities, and these should be carefully studied on the spot. Particular regard should be had for possible changes in relief which are wrought by the heat of the mid-day sun, such as the weakening or breaking-down of snow-bridges, the widening of crevasses, and the bringing into existence of numerous ice-streams, whose courses may by no means be passable. It is in the heat of the day, too, that, through a loosening of their material, avalanches are most likely to be precipitated, and ice-blocks are hurled from projecting rock-surfaces.

CONCENTRATED PEA-SOUP.—In the entire list of journey- or camp-foods there is none, perhaps, that is so clearly entitled to a foremost position as the powdered (Kopp's) or tableted (Norr's) pea-soups. Their nutritive qualities would alone suffice to give them an honorable standing, but to these are added a most palatable taste (the absolute rendering of normal pea-soup), safe carriage, and the extreme of compacting. A few ounces in weight of the powder, judiciously added to water, will give a meal to a party, and the feeling of a satisfied craving of hunger. This form, through the recommendations of Moltke and Wolseley, has been made a standard among the army foods, as much, perhaps, for the sensation of filling that it gives, as for its nutritive qualities, easy portability and cheapness. The late Commander Cameron and Mr. Peary are unstinted in their praise of these condensed soups.

NOTES.

THE EXPLORATION OF SIBERIA.—Perhaps the most important exploration of northern Asia that has been made during the present century has recently been completed by Baron Toll and his geographical associate, Lieutenant Shileiko, who were detailed by the St. Petersburg Academy of Sciences to investigate a reported mammoth find in the region opposite the New Siberian Islands and to make a detailed survey of the little known Anabar tract. The course of exploration covered 3000 miles, extending in various lines from the islands above mentioned far into the trans-Yeniseian region. Many new and important facts bearing upon the physical history of the north were obtained in the course of this exploration, perhaps the most significant of which was the discovery at Buskhaja, on Anabar Bay, in a bed of polished and scratched boulders, of evidences of glaciation, and in the Kotelnyi Island of what is seemingly a portion of the glacial ice itself. Another interesting discovery was the determination that a tree-bed—in which complete trees of a species of alder (*Alnus fruticosa*), fifteen feet long, with leaves and cones, were found—underlies the mammoth layer of Malyi Liakhov, proving that in the mammoth period the limits of tree growth extended full three degrees further to the north than they do to-day. Nearly two thousand miles were traversed on reindeer-back, eight hundred of which were directed across the inhospitable and largely swampy tundras. The extremes of temperature encountered on the journey were measured on an interval of 146 degrees—from 93° F., in July, at the shores of the Arctic sea, to —53°, in November, beyond the Khatanga plateau.

WOMAN'S WORK IN GEOGRAPHY AND EXPLORATION.—The recent adventurous journey of Miss Annie R. Taylor into the heart of Tibet furnishes an unpleasant commentary upon the action of the Royal Geographical Society of London in declining to admit women to fellowship in their body. Miss Taylor, who, in company with five Asiatics, left Tao-chu, in the Chinese province of Kan-su, on September 2, 1892, held for her objective point the still forbidden L'hassa, at the gates of which she met with the usual reverse—stoppage and removal by the city's conscientious officials. These appear to have been the same dignitaries who, in August, 1892, blocked the road to Mr. Rockhill. Miss Taylor's route, which crossed at various points the routes followed by Bower and Rockhill, was one of the most difficult of any leaving the Chinese country, and the success achieved by her is thereby the more remarkable. Miss Taylor seemingly enjoys the unique distinction of being the only woman who has *conducted* an expedition into the heart of Asia, although she is not the only one to have crossed it.—In further illustration of woman's work in geography may be mentioned Miss Ogilvie's course of ten lectures on "The Geology and Scenery of the Alps," which were recently delivered at Croydon, England, under the auspices of the London University Extension Classes, and touched the broad topic of geographical conformation as determined by geological structure, and the special physical history of each section of the Alps. It is claimed that the subject had never before been so fully and systematically presented to an English audience.

THE POSSIBILITIES OF A PANAMA CANAL.—It is not a little remarkable that there should be so much difference of opinion among geographical and engineering experts as to the possibility of constructing a canal across the Isthmus of Panama. It can be safely said, as, indeed, it has been asserted by one of the foremost civil engineers of this country, that the possibility is merely a matter of money; given money enough and the work can be accomplished. The practicability is equally a matter of money – the paying revenue that might or could be derived from the construction. The testimony of unprejudiced experts inclines to the belief that the difficulties of construction have been overstated, and perhaps even grossly exaggerated. Herr Polakowsky, the well-known geographical critic, who has made an extended study into the subject, in a communication addressed to *Petermann's Mitteilungen*—reviewing the official report of the French Commission appointed to examine into the affairs of the Panama Canal Company—expresses himself on the general subject as follows: 1. The most practicable of the tide-level canals to connect the two oceans is that of Panama; 2. The most feasible of the lock-canals is that of Nicaragua; and 3. No private association will ever successfully carry out an interoceanic canal to the extent of returning a paying interest (4 per cent.).

THE RECENT EARTHQUAKE IN GREECE.—The interesting fact has been recently determined by Mr. C. Davison, a member of the Earth Tremor Committee of the British Association for the Advancement of Science, that the earthquake which, on April 27th last, fell with such severity upon Greece, was also appreciable in Birmingham, England, at a distance of nearly 1600 miles from the centre of action. The determination was made by means of a bifilar pendulum and rotating mirror, an ingenious instrument devised by Mr. Horace Darwin. It would appear that the pulsations arrived in Birmingham within fourteen minutes after the occurrence of the earthquake, which would give as an average velocity for the pulsations about 1.84 miles per second.

ICEBERGS AND THE TEMPERATURE OF THE AIR AND WATER.—It is a common belief that approach or proximity to an iceberg can readily be determined by a fall of the mercurial column, the thermometer rapidly registering the lowering of temperature which the ice-mass assumedly brings about. Most competent observers have, however, failed to determine any marked variation of temperature, unless it be almost under the very "shadow" of the berg, and do not regard the thermometer as a good indicator of the near presence of ice. Mr. Russell, F. R. S., the director of the Sydney Observatory (Australia), has recently reviewed the evidence bearing upon the question, as presented by the Antarctic bergs, and finds that even in a sea "full of bergs" no marked effect is produced upon the temperature, and absolutely none by scattered bergs. The contact cold air or water is immediately dissipated by moving currents. These observations should be given full weight by navigators of the old school, who profess to be warned by their thermometers, and regulate their movements accordingly.

THE ADELSBERG CAVE.—The explorations of M. Martel in the famous Austrian cavern, conducted seventy-five years after the first exploration of that locality was begun (1818), have added to the underground passages a length of 1500 metres, making the cavern considerably the longest of any in Europe. The present determined length is approximately ten kilometres, or six miles, exceeding by 1300 metres, or by over three-quarters of a mile, the cave of Aggtelek, in Hungary, which has hitherto enjoyed the reputation of being the largest of the continental caves.

THE DEPRESSION OF LUNCHUN.—Of the comparatively few points which on the land surface are depressed beneath the level of the sea one of the deepest is the basin of Lunchun, in Chinese Turkestan, near the southern foot of the Thian-Shan Mountains, which has been determined by Captain Roborowski to be —305 metres, or just 1000 feet.

Around the World.

VOL. I. SEPTEMBER, 1894. No. X.

A DAY ON THE SHAWANGUNK MOUNTAINS.——FROM SAM'S POINT TO LAKE AWOSTING.

MARY S. HOLMES.

TO stand upon the culminating point of any country, whether it be the roof of the world in the Himalayas, the crowning summit of the Alps, or upon the highest peak of New York's southern hills, is to command the world, and on such a height the scene of mountain and valley and plain is spread out as a great panorama to the eye. So it was with us one beautiful July morning, as, with the fresh breezes in our faces, we stood on the summit of the Shawangunks and traced our earth from the Green Mountains of Vermont to the Highlands of the blue Hudson, peered over Cornell, Wittenberg, Round Top and Slide of the Catskills, followed our own mountains to the southward and lost the view in the Kittatinnies of New Jersey and the Poconos of Pennsylvania. To the east lay the Gap of the Hudson, and to the south, High Point, New Jersey's greatest boast. At our feet slumbered the Wallkill Valley, beautiful in the sunshine. Sam's Point, the highest of the Shawangunks, is 2240 feet in elevation, and rises as a precipitous wall of rock, fractured and rent, from the valley 2000 feet below. The rock of the region, which has given the Indian name, meaning "white," is a conspicuously handsome conglomerate of rounded quartz pebbles, some coarse, some fine, in a siliceous matrix, and the whiteness of the rock is in striking contrast to the black lichen which clings to its surface. We do not see in these mountains the gentle, regular contours of the Catskills, where water's comparatively slow, gentle action has carved out the valleys, leaving the mountains standing between, but here we have a more rugged scenery of cliffs and precipices, of rifts and chasms extending in every direction, and one does not walk far without crossing over or climbing around a cleft in the rocks. The occurrence of the coarse Oneida conglomerate upon the soft Hudson shale is the clue to this ruggedness, for the slipping of the upper rock on its treacherous bed has caused the fissuring of the whole mountain's surface. There is an appearance of power, of grand destruction about the place that gives it a wild fascination. One feels that he is in a place where something terrific has happened.

The combination of extended view, of precipitous wall, of glaring white rock, with its blotches of black lichen, and its great rifts, with huge bowlders everywhere scattered about, makes a scene that is a great pleasure to any lover of nature. Scrambling over these rocks and rifts, grasping at a stunted pine, stopping to pick a fine bunch of huckleberries, is a delight. Down in the depth of the deepest rifts lies perpetual snow, where summer's heat is too weak to melt the winter's store, and down in the valley, they say, ice-cold water rushes from the springs.

All over the surface of the mountain lie great bowlders, rounded travelers from other scenes—brown Catskill from the northward ; the broad white surfaces are as smooth as a polished floor or marble table ; these shining surfaces are scratched and grooved with lines to the southwestward ; the once-sharp edges of the many cliffs are rounded off most perfectly. What does it mean? The Prophet of the Mountains, our old friend, who has lived there all his life, has learned the lesson, told so eloquently by the mute rocks, of the great mass of ice coming down from the northward and covering all the region. He has learned how the glacier carried and left the bowlders, how it scratched and grooved and polished the rock, how it rounded the sharp edges of the chasms, and changed the region, making a different scene from what it would have been, had there been no ice age in America, or had the Shawangunks been much farther to the south. We have learned his lesson, too, and when the old man knelt down and with his knife cut away the clinging lichen from the rock and scraped from beneath the soft, white, powdery "meal," the glacier's parting gift, we all seemed very near to nature, listening to the very secrets of her work, accomplished so long ago.

Leaving Sam's Point we followed the path along the edge of the western chasm for quite a distance, leaping bowlders and rifts, sliding over polished surfaces, till we came to the pretty little Maratanza Pond, with its setting of high, naked pine trees, suggesting to our minds any region but our own. The four lakes, Mohonk, Minnewaska, Maratanza and Awosting, lie on the summit of the Shawangunks and may be glacial lakes. They do not appear, however, to be the result of drift deposit, but their beds may be depressions that were scooped out by the glacier as it passed over the surface. Of the four lakes, Maratanza is the smallest and Awosting the largest, and it was our pleasure to see both on that delightful day's travel.

Passing Maratanza our path was still rough till we came to a damp, marshy region where a peaty accumulation is forming from the rich vegetation ; then again over rocks, finally reaching the little Verkeerder Kill, or Katy Kill. Here we turned, and following the course of the stream, jumped the rocks, slid over the mossy carpet that seems to have supplanted the water in many places, bobbed our heads and rescued our hats from the overhanging branches and at last stood upon the edge of the precipice of conglomerate over which the brook dashes to the bed of shale below, forming the Verkeerder Kill Falls. The little stream had, no doubt, once fallen directly over the high wall to the Wallkill Valley to the east, but it had worn its way backward to its present amphitheatre, leaving the deep, narrow gorge in front. The limpid waters emerge from a cave of rhododendrons, ferns and moss, and break over the stones in a hundred rainbow tints. Although when we saw it the amount of water was less than is often the case, we were still surprised to see so much, as we had walked over a dry stream-bed for quite a distance. The Verkeerder is one of those "lost rivers" that flow underground a part of their journey to reappear again at unexpected times. We ate our lunch in the lovely clove above the falls, where water, rocks, moss, ferns and blooming rhododendrons under the overspreading trees made an ideal spot at a summer noontide.

Leaving the falls, we partly retraced our way along the stream, then veering to the northward, clambered up the steep hill that began our walk to Lake Awosting. But before climbing the hill we deposited coats, shawls and food supply (a box of candy) in a safe place to await our return. It is such a delight to travel perfectly untrammeled, to leap from rock to rock, to climb up and down hill, without hindrance—so we thought that afternoon. "Be very careful not to lose your way," "watch out for the blazes" "keep Mud Pond on your left"—these were our parting injunctions from some experienced friends, and indeed they were very necessary. Over rounded, traveled bowlders, over sharp-edged, white conglomerate, unmoved from its parent rock, over broad, polished floors, slanting at dangerous angles, over rifts, over fallen trees, from blotch of red paint to blotch of red paint, we made our way, never daring to go on until some one's quick eye had detected the next "blaze," for the path might be easily lost and hard to find. We trudged on and on until the delightful coolness and the lengthening shadows of the coming evening were upon us, and on we went, for we must see Lake Awosting, and the hope of "camping out" was lurking in many minds. Suddenly we were surprised by a deep voice to our left, and then another and another, and we recognized the tones of the bull-frog, in conversation in the shallows of Mud Pond. We were glad to find "Mud Pond on our left," for we had been especially warned, and had it gotten to the right, we should not have known how to proceed. Hurrying on rapidly, for we must make time to see Lake Awosting by daylight, we were stopped by the sight of a sudden drop of land on our right, and looking over a chasm in our way, saw a wonderful vision of tropical luxuriance. Could vegetation be more massive, more generous, more beautiful than this? It seemed a perfect revel of life. Down in the fallen depth of earth, where moisture is always abundant, and the sun's heat can scarcely penetrate, where storms can do no harm, these mighty trees, the American larches, the hackmatack of the Indians, or tamaracks, and these giant ferns have grown so great; it was like a revelation from another clime to behold them on the mountain top. Turning a square corner, where the great mass has fallen, we passed, walking carefully, for the narrow fissures are treacherously filled with vegetation, and one might easily make a false step, and farther on climbed a steep promontory, and soon had our first view of beautiful Lake Awosting—a welcome sight, for the day was almost spent in the shadow of the cliffs that hem its banks. We skirmished onward, following carefully the masses of red paint, till we nearly reached the lake, then, deserting the path, made a rush for the shore, and reached it just in time to see a magnificent sunset reflected in its quiet waters. A lovely picture, and all our own, for there was no sign of habitation, and ours it was to be, for we were to realize the desire of so many to "camp out," as return would have been as impossible as it was undesired. Three of our party started out to prospect, but returned at the appointed time, concluding that we had found as good a place for our camp as could be desired. One had brought with him a pretty, red-headed woodpecker, that he had caught as the bird hopped before him, lamed in its flight. Busy hands collected wood for the campfire, moss and leaves for softer covering to the rocks, huckleberries for supper. An excellent provision of all these luxuries was made, although the berries were neither so large nor so abundant as we had found them in the afternoon, and as we collected we thought of the cloaks we had been so glad to dispose of, and the box of candy lying at the foot of our first cliff. (We learned afterwards that candy and water make an excellent breakfast.) We had a hearty supper of berries and lake water; the bull-frogs conversed for our entertainment; the full moon rose, and at 10 o'clock our roaring fire was built—a source of pleasure, of admiration, and comfort through the long night. How the flames leaped and danced, and the fiery tongues shot out in livid hues, as the crackling and snapping and swirling made a music that only fire can make! Here and there the light flashed out on some new track; now a severed log tumbled and rolled in hot, bright confusion from its bed; merrily the dry wood lent itself to the frolic of the fire, and the damp, green boughs sputtered and fussed as though they had been plucked from life too soon. What a fountain of scarlet sparks was made as they added new fuel to the flame, what a solid, dull, gorgeous purple-red when the old log burned down and down! Who is the poet of fire? He could have had inspiration from our camp that night. All night long the fire burned. At midnight a few berries were given to each person. At half-past two the beautiful woodpecker, dressed and roasted, was served, each one receiving the one-ninth part, which was found to be both satisfying and strengthening. For a time we heard the bark of dogs on the mountain, then perfect stillness lasted through the night—such perfect stillness, with only our fire to break the silence. As toward the morning the air got colder, high and higher the logs were piled; presently the sky began faintly to grow lighter; a thrush sang in the wood to our right; brighter grew the sky, till at last we could see around us, and morning had come. At half-past four we were down at the lake-shore seeing the sun rise. The last night's sunset had been a glorious burst of reds and yellows; the morning's sunrise was a delicate tinting of pinks and greens—an exquisite picture of beauty and promise. We left Lake Awosting in the sunrise, and it will always be in our memories a pearl in the mountain, reflecting the light above.

A SUBTERRANEAN DRAMA.

UNDER this heading M. E. A. Martel, the distinguished speleologist or cave-explorer of Europe, whose researches have recently added considerably to our knowledge of the Adelsberg grotto, furnishes to *La Nature* an interesting account of the episode in the Lueg-Loch or Lur-Loch, near the Styrian capital, which so nearly resulted fatally to the seven members of the Höhlenforscher—Fasching, Fölzmann, Zweyer, Oswald, Maier, Kurz and Haidt—who, on the 28th of April, attempted the exploration of the lost passage of the Semriach. The accompanying sketch of the grottoes and connecting passages well illustrates the situation of the imprisoned explorers, and the conditions which governed their imprisonment and rescue. The exploration was planned for a period of twenty-four hours, but by the sudden rising of the cavern stream, the Semriach, and the closing off of the outwardly communicating entrance, it was prolonged to 206 hours, or to eight and a half days. Between the refuge-chamber (known as the Fölzmann Höhle) and the exterior there intervenes an interval of some 250 feet, which is occupied by the low passage of the Semriach, into which a siphonal channel, communicating on the inner side with the Fölzmann Höhle, opens. It was the blocking of this siphonal passage and its continuation by the rise of flooding waters which prevented escape.

The rise of the flooding waters began a few hours after the entry of the party into the cavern, and continued with such violence as to completely choke up the passage with all manner of earth, rock and vegetable débris. On the 30th, energetic measures, under the guidance of an efficient body of sappers, were taken looking to the relief of the prisoners, but the continued rains and consequent increased flooding permitted little to be accomplished. A happy thought suggested the casting into the torrent of a box of provisions and candles, and the hope that through some chance it might reach a haven near to the imprisoned explorers was realized. Thrown in at 6.30 of the evening of the 30th, it reached its hoped-for destination at 11.30 of the morning of May 2d, and to it, doubtless, we owe one of the most miraculous escapes in cave exploration. The first news of the safety of the party was brought by the diver, Rodolphe Fischer, who on May 7th, profiting by a lowering of the waters, successfully penetrated through the débris to within hearing distance of the entombed. To the anxious inquiry of, a shout and question, he was overjoyed with the receipt of "We are all alive. . . . We have a piece of cheese and a candle ; the helping case has been received and it has saved us." With renewed exertions, and through the special guidance of Herr Putick—the associate of Martel in the exploration of the Adelsberg grotto—a complete breach through the enclosing débris was finally made, and at 5 o'clock of the same afternoon the first of the saved again saw the light of day. Much difficulty in the work of salvage was encountered through the low temperature of the water, 46° F., in which long immersion was all but impossible.

Herr Fasching thus recounts the incident of the capture of the case : "Our provisions had been exhausted and we had lost all spirit. One gleam of hope sustained us. Gratz would save us we thought. . . . The noise of the waters was deafening. It was all but impossible to sleep, and when fatigue overcame us, we felt as though we were anchylosed. We hardly conversed with one another, and my own distraction was the smoking of cigarettes. Monday and Tuesday passed this wise, and on Wednesday morning, when the pangs of hunger had already began to devour us, we had resigned ourselves to the fate that the cave would be our tomb. Behold, of a sudden, amid the black waters, a small case emerging at our feet ! Instantly we seized it, opened it, and pored over its contents of bread, cheese, meat and candles. A letter, joined to the express, informed us that the case had been cast into the stream of the Lueg-Loch on Monday, at half after six in the evening ; we regained it on Wednesday, at half after eleven in the morning. Saved !"

Commenting on the incident, and the narrowness of the escape from a frightful catastrophe, M. Martel emphasizes the danger of visiting unknown caves which carry running water at any period of the year except during the months of June, July, August and September—the period more properly of June 15th–September 15th ; at all other times, when the cavities act as receivers for the surplus waters of accumulated rains, freshets and snow-meltings, the passages very readily and unexpectedly fill up, threatening that form of closure which was so unpleasantly exhibited by the incident of the Lueg-Loch.

HAMBURG, A VISIT TO THE GERMAN PORT ON THE ELBE.

ADOLPHE SMITH.

MR. ADOLPHE SMITH, the well-known correspondent of the Philadelphia *Evening Telegraph*, sends to that journal the following interesting account of Germany's greatest port :

It would be difficult to find a greater contrast than that afforded by the towns of Berlin and Hamburg. This contrast is the more pleasing as it is a dull railway ride from Berlin to Hamburg, which, however, does not last longer than four hours. At Berlin there is hardly any water to be seen, nothing but a miserable little river. At Hamburg we have not only the broad and deep waters of the Elbe and innumerable canals, but there are two majestic lakes, the Binnen-Alster and the Aussen-Alster. At Berlin all the streets are broad, straight and

UNDER SAM'S POINT.--SHAWANGUNK MOUNTAINS.

the houses all new, handsome sometimes, but never picturesque. At Hamburg a great many streets are narrow, crooked, the houses very old, and often extremely picturesque. There is considerable animation in the streets of both towns, and in both there is also evidence of opulence. The structure of some of the houses at Hamburg bears a decidedly English character; or perhaps I should say that in England many houses have a decidedly German appearance. In any case, at Hamburg, more than at Berlin, the fact that the English and the Germans are kindred races is especially evident. I arrived at Hamburg on a Sunday afternoon and found the shops all closed, even the newspaper shops; and this again recalled English customs.

But if there was no business going forward at Hamburg on the Sunday, everything that related to holiday-making or the pleasures of life was, on the contrary, reaping a rich harvest; and Hamburg is a great place for enjoyment. Indeed, there is a whole district of the town given up to holiday-making. This consists of a very broad thoroughfare in the St. Pauli quarter, called the Spielbudenplatz, and it is one of the most characteristic parts of Hamburg. It is the reverse of an aristocratic neighborhood, and resembles a permanent sailors' fair. Close by there is an elevated ground converted into a park, from whence a magnificent view of the port of Hamburg can be obtained. There the sailor and his lass may stroll about and say sweet things to each other, till at last, tired of talking, they can find, close at hand, theatre, circus, music halls, dioramas, merry-go-rounds, serious and light music, military bands and orchestras of stringed instruments, rifle galleries, penny peep-shows, swings and all the multifarious diversions of a fair, combined with the more permanent amusements of a town. To suit the crowd there is a theatre where the performances are in the local lingo, a jargon which the best German scholars cannot in anywise understand.

Shops and offices and business places being all closed on the Sunday, every one is free to seek rest or amusement, and of course the Spielbudenplatz is thronged with foreign sailors and native holiday folks. It reminded me, in some respects, of the Prater at Vienna. It seemed a somewhat smaller and vulgar edition of the celebrated resort of the Austrian capital. Though, on the whole, this is the haven of low-class life, there is nevertheless a sprinkling of the more refined and educated sections of the population. For instance, just at the entrance of this thoroughfare, where there are so many low music halls, there stands a large, high-class concert house. A portion of the inside imitates a sort of grotto, and in the picturesque caves supper can be served. Then, for the summer, there is a large open garden, with chairs and tables in all directions, and many colored lamps to illuminate the same. At one end of the garden a splendid military band plays selections of operatic and other music. This garden is frequented by numerous families. They take a table to themselves, form a happy family circle, drink beer and, of course, the men smoke. As a great dissipation, the younger daughters occasionally get up and walk round the garden.

These little excursions, that last on an average three to five minutes, are the means of showing off the new Sunday dress, of seeing what friends are present at the concerts, and, perhaps, of noting how many smiles or looks of admiration follow the youthful pedestrians. Possibly, all these young persons who walk round the tables are not all quite as respectable as we should like to believe. But the German police regulations are extremely strict. Whatever may be hidden below the surface, external appearances are strictly maintained. The mother of a family may take her virtuous daughters out to these places without fear. Nothing will occur that will either shock or offend; and though Germany is not more virtuous than any other country, the ways of vice are infinitely more discreet and secretive. At Hamburg, as at Berlin, I was greatly edified by the pleasant and innocent manner whole families took their enjoyment together, round the same table, with the same excellent but excessively mild beer, listening to about as perfect music as can be obtained in any part of the world; for what can surpass a real German military band? Of course I must use the adjective real, for there are any amount of German bands that pretend to belong to the army and that are not military at all. These may more frequently be met abroad; they are the bad German musicians who would never get any one to listen to them in their own country. The one great joy of life in Germany and in Austria is that there is always excellent military music easily accessible, and which can be enjoyed without any outlay of money. With all the evils that attend militarism, it must at least be recognized that it has greatly assisted in developing the appreciation of good music. My only regret, if permanent armies were abolished, would be the abolition of the military band.

There have been many alterations effected in Hamburg of late. From one point of view, at least, these may be qualified as improvements. Old quarters have been demolished, and we have now modern houses, of monotonous architecture, healthy but uninteresting, taking the places of antique, picturesque, charming dwellings of the old Dutch style of architecture, with high, gabled roofs, narrow, quaint windows, all of wondrous shape and design, all well calculated to enchant the artist and to harbor vermin and disease. The Dovenfleet quay that borders one of the principal canals was just such a place. It seemed, to judge from a photograph, one of the most picturesque places of Hamburg; but when I got there, instead of quaint old houses standing on piles driven into the canal, and small boats passing underneath the first floor parlors, there was a broad modern quay, lined with modern offices and houses, all looking healthy and clean, but so common-place! The Dovenfleet was but a memory of the past. Fortunately there remains elsewhere much that is old and interesting. Here, it is true, the largest number of cases of cholera occurred during the recent great epidemic; but it is a very serious matter if sanitation is to mean the destruction of all that is beautiful and historical in our old towns. Surely there must be some means by which these quaint and interesting places might in a great measure be preserved. Here and there an opening must be made to give more light, more air; but that is no reason for destroying an entire quarter. Much of the destruction, the vandalism, that takes place is not at all due to sanitary necessity, but rather to the belief that modern buildings will let at higher prices and prove more profitable. That art and history should be destroyed, so that some individual may make more profit, will one of these days be qualified as an act of high treason against the interests of the sovereign people.

Unfortunately, at Hamburg, the people are not sovereign at all. Hamburg used to be a free port, but this freedom only related to customs dues, and now the freedom does not extend beyond the dock warehouses. No goods can leave these warehouses without paying duties according to the German imperial tariff. As for real freedom, there is none at Hamburg. The Municipal Council of this town, which calls itself a Senate, is elected by a small number of privileged inhabitants. The best proof of this is the fact that the three members who represent Hamburg in the Imperial Parliament are all three members of the Social Democratic party; yet, out of the 160 Municipal Councillors of Hamburg, there is not a single Social Democrat. This extraordinary difference clearly shows that the government of the town is the reverse of democratic. This also accounts for the fact that the slums of Hamburg have been shamefully neglected and the people allowed to live anyhow. Thus the cholera epidemic found ready victims and wrought the most appalling havoc in these poor quarters.

The want of a popular local government may also account for the fact that there are singularly few architectural monuments, museums, scientific collections, and other such institutions. The Hamburger is a business man, and has, therefore, very little time to think of the public weal. It is curious how towns as well as individuals show the degradation wrought where money-making is the only object. The free harbor, or bonded warehouse, extends over 1750 acres of land, and is covered with handsome, tall, red-brick warehouses that from a distance seem to rise out of the bed of the river, and are surrounded by ships. Some 8000 vessels enter the harbor annually, representing more than 4 000,000 tons burden, and this used to be one of the great ports for emigrants. More than 70,000 emigrants have sailed in the course of a year from Hamburg for America. Now this special traffic has been almost entirely stopped. There is some talk of reviving it by building an emigrants' home in the port and in an isolated part of the docks. Here the emigrants would be kept in quarantine for a time sufficient to remove all obstacles that might be placed against their landing in America. But a difficulty has arisen. The most sensible way of draining this home would be to drain direct into the river.

This, however, the authorities will not sanction, unless the sewage is first absolutely sterilized. Who, however, knows how to absolutely sterilize sewage? A German chemist pretends that he has got an invention, and he is going to make experiments expressly for the promoters of this emigrant depot scheme; but will he succeed? In the meanwhile, and as stated before, the tide of emigration has been practically stopped. Not that this will save America from cholera. If America is predisposed for cholera, the disease in all probability will come. No tide of emigration is necessary to spread cholera. One single individual, one single piece of soiled rag, will suffice. No country is safe that is not absolutely isolated, and no large country can absolutely isolate itself. Nor is it proved that absolute isolation would be effective. There is much to show, on the contrary, that cholera is of spontaneous growth ; that it is an aggravated form of diarrhœa or of typhoid, and perhaps of influenza. Therefore too much stress must not be laid on the fact that now there are barely twenty emigrants who sail per week from Hamburg for America, whereas formerly the weekly number often exceeded 10,000. False hopes must not be built on this ; for the only true protection against cholera is good sanitation.

This my visit to Hamburg has again clearly demonstrated. Naturally, I carefully visited the districts where there had been the most cases of cholera, and they were always the most unsanitary and overcrowded parts of the town. The water supply being contaminated, cases of cholera occurred in all directions, but in the better-aired and healthier districts there were but isolated cases; it was on the unhealthy areas that the disease wrought fearful havoc. Had all Hamburg been in a sanitary condition, a few cases of cholera might have occurred, but there would not have been such an appalling epidemic. The Senate does not, however, seem disposed to make the necessary improvements. Great waterworks have been built in hot haste, so that now the waters of the Elbe are filtered before they are drunk. This is a very important improvement. for nothing can better help to spread a disease than contaminated water ; but the cause of susceptibility to disease is due to overcrowded, unhealthy dwellings. In that latter respect but little improvement has been effected.

ONE OF NATURE'S ICE FACTORIES.

THE TAKU GLACIER.

ELIZA RUHAMAH SCIDMORE.

THE summer tourist who sails the thousand miles northward from Puget Sound enjoys scenic features unequaled elsewhere in the temperate zone. All the ice wonders of Greenland fjords are enjoyed under a summer sun, with the densest forests and most luxuriant vegetation around him. In what most nearly corresponds to the Alaska coast region, the vegetation is not as rich as in Alaska and the glaciers do not reach to the water's edge and drop off icebergs into the sea.

The first of these tide-water glaciers, as distinguished from the common Swiss or Alpine glaciers which terminate in valleys with moraines sloping away from them, is close by the Alaska tourist's route, but never visited. The Hutli, or Thunder glacier, is in latitude 56° 50′ N., just above the mouth of the Stikine River and almost opposite the north entrance to Wrangell Narrows. In latitude this nearly corresponds to Edinburgh and Glasgow on the Atlantic side of the world. From the description given by Vancouver, in 1794, the Hutli has receded, or shrunken, and given two miles of its former bed to the sea in 300 years ; but it is very picturesquely set at the far end of a narrow fjord, that is often completely blocked by the masses of floating ice, small icebergs that have fallen from the front of the glacier. The weathering of the ice, the pressure of the mass behind, combine to keep the ice-cliffs in which the glacier terminates constantly changing and altering their fronts, as sections are detached or great masses are loosened and crash with awful roar down the icy inclines to the water. Because of the fearful noises issuing from this echoing, rocky cañon, the Stikine Indians believed it to be the retreat of their terrible Thunder Bird, a mythical creature that flapped its wings and made the heavens roar, that glanced and made fire shoot through the clouds.

Those poor children of nature, creeping over the water in their small canoes, rarely venturing beyond the tide's line on land, saw only evil and feared these uncomprehended forces in the world around them. They saw nothing of the beauty or grandeur of the glacier and all its manifestations caused terror. By their half-poetical legends the mountains were once living creatures, imbued with spirit and life, and the glaciers are their children, born of them, nourished by them and carefully held in their protecting arms. The mountain mothers lead them down and dip their feet in the sea, they cover them with stones and earth to protect them from the destroying summer sun, and in the winter all sleep safely under the deep blanket of snow. Then the glaciers have their children, the strange man-faced seals, who live in the ice caves below the water-line—an evil sort of water-fairy. Besides these there are ice spirits who inhabit the crevasses and under-world of the glacier, Sitth-too-Yehk, the great ice spirit being an implacable, unappeasable being, who menaces and destroys all who approach him. An Indian will not speak above a whisper while crossing a glacier, nor eat, nor drop any morsel of food in the ice kingdom, and always goes through some little ceremony, or makes medicine, when he ventures into Sitth-too-Yehk's realm. The echoing reports of opening crevasses, of the avalanches of ice rolling down the glacier-front to the sea, are manifestations of his power and wrath. Seal hunters when canoeing among the bergs aim never to strike one of these subjects of the ice spirit, lest they offend that evil one, and should one of the uncanny man-faced seals, with its human hands, ever appear to them, only emptying into the sea the basket of fresh water they carry with them can protect them.

STRANDED BERG, IN BARTLETT'S BAY, ALASKA.

The many glaciers that used to reach the water in the basin at the head of Taku Inlet, and the salvos of ice artillery that constantly rang and echoed on the air, caused the Indians to call those glaciers the Ice Spirits' Home. A century ago this broad basin was almost entirely surrounded by ice, and Vancouver wrote of his visit, August 10, 1794: "From the shores of this basin a compact body of ice extended some distance nearly all around; and the adjacent region was composed of a close, connected continuation of the lofty range of frozen mountains, whose sides, almost perpendicular, were formed entirely of rock, excepting close to the water side, where a few scattered dwarf pine trees found sufficient soil to vegetate in; above these the mountains were wrapped in undissolving frost and snow. From the rugged gullies in their sides were projected immense bodies of ice that reached perpendicularly to the surface of the water in the basin, which admitted of no landing place for boats, but exhibited as dreary and inhospitable an aspect as the imagination can possibly suggest." In support of this the Indians tell that in their forefathers' time the Kadischle (Spaniards) glacier, a large one of the Swiss type on the north shore of the basin, once broke off

ALONG INDIAN RIVER, ALASKA.

into the water like the Taku, their Sitth-Klunna-Gutta, or Spirits' Home.

Turning in from the broad Stephens Passage, just as the smoke of the great quartz mill near Juneau becomes visible, the summer steamers follow up the long Taku Inlet for eighteen miles, before they reach the source of all the little icebergs that have gemmed the water for an hour. A line of beautifully sculptured ice-cliffs, a mile in length, rises straight from the water to heights of 100 and 200 feet, spired and pinnacled and fretted in ten thousand fantastic lines of fracture. In veins and places along this glittering palisade the snowy, silvery whiteness shades to intensest blues, the color darkening with the density which the tremendous pressure has caused. The bluest of this glacier-ice quickly weathers and turns into an opaque white, resolves itself back to its original snow-crystals when exposed to light and air; but every hour the falling masses reveal some new vein or cavern of sapphire blue in the ice-wall, and the honeycombed bergs in the water breaking apart and turning over reveal newer and bluer surfaces. All the basin is strewn with gigantic blocks, in which one sees hues that never were in other substances, even the most weathered and worn bergs showing a sapphire base-line, or one of purest turquoise blue. Clear green and often amber-yellow are seen in these floating gems, and there is a color feast spread all over the muddy, gray-green expanse of turbid glacial water. There seem to be no medial moraines striking the surface of the ice-plain, and no tracks of débris cloud any part of the ice-wall. The ice-river fills its mile-wide cañon from side to side, leaving no room for lateral moraines, nor is there any beach or possible landing-place beside it, as at the Muir Glacier. The purity of this great mass is one of its greatest beauties; its apparently rapid motion keeps the front in constant action, crash following crash and cutting the ice in more and more fantastic shapes. Facing squarely to westward it is a radiant vision from noonday on until 9 and 10 o'clock of the long summer evenings, when the last sunset rays illumine it. One should see it, too, in the clear light of the early morning, to know how blue, intensely blue, its ice particles can be, and to see with clearness the marvelous effects of white on white, all the finely detailed work of that matchless wall.

While this Taku glacier is only eighteen miles distant from Juneau, the largest town in the territory, it has been overlooked by scientists, artists and other vacation visitors, to whom such nearness to a base of supplies and mail communication is so much to be considered in choice of a camping-site. Several members of the French Alpine Club, who came to America to climb Mount St. Elias, but desisted when they learned there were no guides in the country, spent some time in camp in the basin while hunting bear. John Muir only "glanced" at the Taku from his canoe when he made his great glacial hunt along the coast, and geologists in general have confined themselves to the larger glaciers in Glacier Bay. The Coast Survey charted the waters, established the height and length of the ice-wall in 1890, and renamed the glaciers; and in 1893 the camps of the Boundary Survey were established along the Taku River. But no one has explored this glacier to its source, mapped it, or measured its daily advance, and an interesting work and some laurels await the zealous geologist who undertakes it.

The busy mail steamers do not always visit the Taku in the summer months, but the large excursion steamer always goes to the Taku for its ice supply. The commander declares it the cleanest, best made ice in the territory, and will have no other in his ship, and this lassoing and netting of icebergs is an exciting affair that rouses kodaking tourists to the highest pitch of excitement.

"Ah! to think!" said a great scientist, as he watched ice-gathering off the Taku. "Just to think! The vapors rose, the snow fell, the *névé* packed and pushed the ice-crystals down all the length of that cañon to the sea, and all that beautiful wall exists that its fragments may make ice-cream and keep the butter hard for the summer tourist!"

CAVE HUNTING IN PENNSYLVANIA.*

BY H. C. MERCER.

RUMOR had reported the existence of a cave in Monroe County, Pa., which Mr. T. Dunkin Paret after some searching discovered in 1880 on the top of a hill overhanging Cherry Creek, about four miles from Stroudsburg. Eight hundred feet above and five miles west of the Delaware River, with its nearest drinking water, the creek, one-fourth of a mile down the steep, and eight or nine miles north of the glacial moraine, the damp, chilly hole seemed hardly a good lair for beasts, much less a shelter for men. When Mr. Paret had removed the débris which choked its broad arch, so that a man could scarcely wriggle like a snake 150 feet in, he encountered traces of men and animals in a top layer of limestone roof-splinters and down-slidden outer talus thinning inward into less stony cave earth. All this relic-bearing material lay upon a bed of clay of unprobed depth, which appeared to overspread the whole cave bottom, and it was always above this clay and never in it, that Mr. Paret's workmen found (often in his absence, for business prevented his continued supervision), the specimens collected : the thin chipped blade of argillite (fifty feet in to the extreme right, depth not stated) ; the four bone awls ; the potsherd (outside the entrance on a ledge) ; the bone fish-hook, needle and harpoon, along with remains of the lynx, gray fox, wolf, skunk, weasel, raccoon, mole, dusky rat, little brown bat, woodchuck, porcupine, beaver, muskrat, gray squirrel, ground squirrel, meadow mouse, white field mouse, wood rat, gray rabbit, deer, elk, wild turkey, turtle, box turtle, snapper, snake, three species of Helix, a Unio and a Margaratina, besides (to make the discovery particularly noteworthy) the following remarkable objects :

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*Read before the Academy of Natural Sciences of Philadelphia.

THE ENTRANCE TO HARTMAN'S CAVE, PA.

(1) A perforated marine shell-bead made from the *Conus tornatus*, alleged by a farmer to have been brought from the cave trench by his little sons, which, on the au-

thority of Mr. Geo. W. Tryon in 1880, and Mr. Pilsbry in 1894, belongs to the Pacific Coast mollusca of Central America, and which therefore suggests the whole question of aboriginal trade and the query whether the cave occupants had really obtained a shell from somewhere nearly 2000 miles away.

(2) Several teeth of the reindeer, which seem to infer a colder climate.

(3) A tooth of the American bison asks us to account for the presence of this browsing animal of the Mississippi plains in the easternmost mountain steeps of the great forest.

(4) The jaws and teeth of the extinct peccary, *Dycotyles Pennsylvanicus*, which with (5) the teeth of the extinct giant chinchilla, *Castoroides Ohioensis*, suggest antiquity, though we cannot yet prove that these animals became extinct in Pennsylvania more than 300 years ago.

(6) Two teeth of a horse, discovered at a point and depth not noted, which Dr. Leidy (who visited the cave in 1880 and identified all the bones then found by Mr. Paret), says belong to an indigenous species. If this be so it may well set us to wondering what aborigines on the hilly upper Delaware were doing with horses before the time of Columbus.

Neither Dr. Leidy nor Mr. Paret has asserted that the human remains of this second known cave of importance in the Delaware Valley were those of Indians or any other people definitely named, or that the bones, often rodent-gnawed, and the scanty human refuse belong to one and the same period of occupancy; so it seemed worth while for the sake of the buried human story of the Delaware Valley to go back to the cave in October, 1893, and study what might be left of the original layers, to determine, if possible :

Whether the animal and human remains were contemporaneous ; whether the human remains were Indian remains; and whether the human remains were of geologically ancient or modern date.

Mr. Paret showed me the cave on the hilltop October 17, 1893. Nearly all the upper stratification had been shoveled out, until one could walk in under the broad, chilly arch for 117 feet 6 inches. But as the unfathomed clay remained underfoot from end to end, and fringes of the original débris lay along the right and left walls just inside the entrance, and as the talus heap outside had only been trenched through the middle to clear an ingress—and so showed its original stratification when its edges were pared down—there seemed some chance of recovering the lost threads of the story.

Two men shoveling five days in the inner clay and slicing the outer talus, our examination of the remaining small fringes of débris brought us to the first question :

Were the animal and human remains contemporaneous?

If they were not, no matter what the bison, horse, chinchilla and reindeer meant in the cave, their bones told us little of the date of man's visit, and their discovery formed no interesting link between archæology and paleontology. Our trench 40 feet in from the entrance—3 feet 8 inches wide, and 22 feet 3 inches long—dug for possible hidden layers and bottom at right angles across the cave floor, showed a continuous homogeneous bed of exquisitely fine clay, deposited in thin laminæ, rarely sprinkled with sand pockets, and underlaid with a film of sand resting on an uneven limestone floor, at 5 feet 11 inches ; 10 feet 7 inches ; 11 feet 6 inches, and 14 feet 1 inch.

As no sign of life, no interrupting layer from top to bottom, was apparent, it seemed that it could be relieved of all connection with Mr. Paret's discoveries. The animal remains and human refuse must have all belonged to the débris and cave earth above it, and it only remained to be asked, before we were done with this all-important test of stratification, whether Mr. Paret's relic-bearing upper deposit of roof slivers, rotten leaves, human relics, bones, charcoal and ashes, gathered dust and inrolled talus consisted of one layer homogeneous throughout, telling of one uninterrupted time of occupation, or of several layers differing in character, separated by interplaced bands, proving time intervals between the visits of man and beast. The trouble was that nearly all this cave floor material had been dug away, and all we had to guide us was what was left of it, its outer end, so to speak, in the talus. But when we cut into this talus just outside the entrance we did what we would have done had we explored the cave at the start, and when we found a thin layer of human occupancy in it 1 foot thick and 1½ to 2 feet below its surface, we inferred that this human layer was but a continuation of the lost human layer inside the cave. Yet as the conditions for soil formation outside probably differed from those inside the cave, and as we only penetrated 10 to 12 feet into the outer talus, without reaching the clay or its equivalent that should have been below it, there was a chance that our talus was not a fair end-slice of the cave, and that there might have been several human layers inside against the single one in the talus outside.

Too much critical ground had been lost, and we had to be satisfied with the rediscovery of one human layer at least, which we had a right to call either the single layer or the uppermost of a series of layers originally found in the cave. To its date or to a later time evidently belonged the bones which Professor Cope, who has assisted me in this work, has kindly identified of the turkey, chipmunk, cat squirrel, marmot, smaller vole, larger vole, short-tailed shrew, raccoon, skunk, gathered by Mr. Paret and myself in the aforesaid side fringes of débris just inside the entrance.

But as to the original bones found in 1880, careful side cutting into the cave floor in the first place might have shown which of the discovered fragments were really part of the cave feast too well bedded between the fire sites to have been scratched out of older under layers and into newer and later layers, and which were not, but these clues have been lost.

In some caves every bone found has seemed fairly and clearly part of the midden heap. But it was against all the evidence produced at Hartman's that the place had been a lurking hole for small animals. Some had come into the crevices to die, leaving their skulls. Others, whose bones rodents had gnawed, had been brought in by carnivora in the first place or carried by pilfering rodents from the human feast.

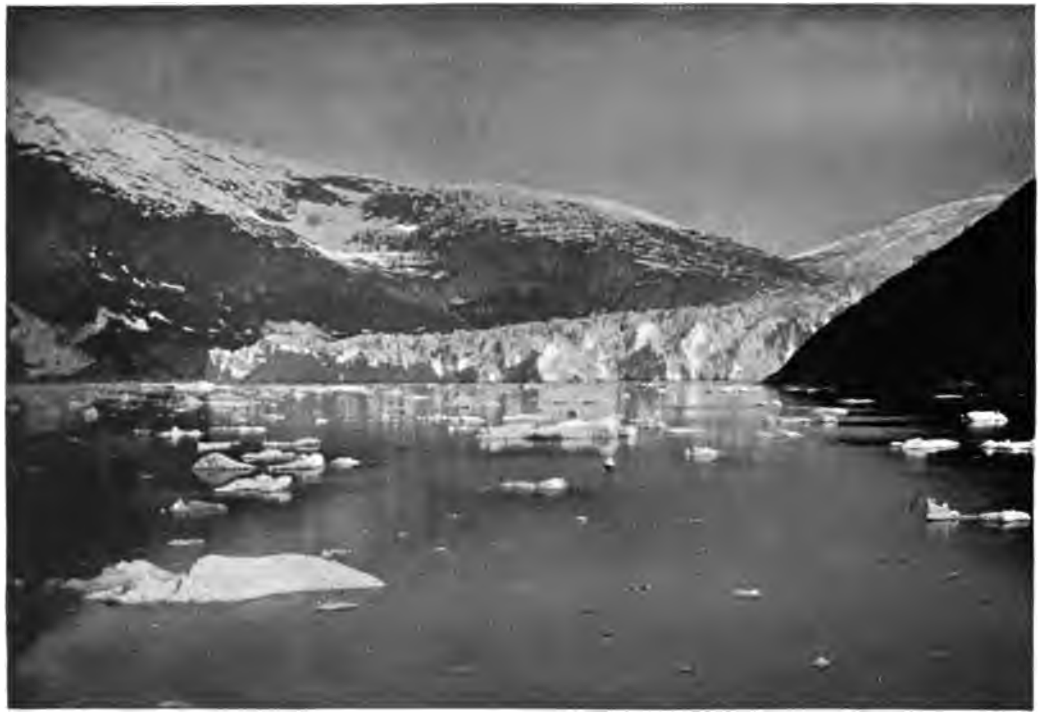
There is, therefore, only a probability that man killed and ate bison, castoroides and peccary in Hartman's Cave, since, minus the lost layers, we may say that there is no proof that these animals did not come there to die, or that they were not carried in whole or piecemeal by large carnivora, when their bones, though lying on the cave floor long before man's advent, would have come in close contact with his subsequently built hearths.

As to the second question: Were the remains Indian remains? The Trenton Gravel Man, if we grant his existence, must be ruled out of Hartman's Cave, for there was not one of his described rude, leaf-shaped, turtle backs found among the chipped blades and arrowheads that in themselves denied his existence there. Whether the human remains found by Mr. Paret came from the same layer in which I found mine, or from other layers now untraceable, there is no need of searching for a new and as yet undescribed cave occupant to account for the bone awls common at the Trenton Delaware Valley site found by me in the Indian layers at the Forge Cave in Virginia, at the Hummelstown Cave in Dauphin County, Pennsylvania, and at the Nickajack and Lookout Caves in Tennessee. The hammerstone, argillite cache blade, pottery and chert arrowheads are duplicated at the Lenape villages at Point Pleasant, Ridge Island and Gallows Run on the Delaware River, while the single barbed bone spear from a shell heap explored by me in September, 1891, on York River, Maine, can be again referred to the red man.

We may safely say that the notion of a precedent people vanished at Hartman's Cave, and that the only man that I found there or that I have reason to suppose that Mr. Paret found there, as the possible contemporary of the reindeer and bison, extinct peccary and giant chinchilla, was the chert-using, pottery-making Indian of the Delaware Valley, already the possessor of the bow and arrow and the quarry-denoting cache blade.

We ask the third question: Were the human remains of geological antiquity or of modern date, and, granting the association of the extinct mammal bones, can we use their presence to prove great age? We must remember that the absence of historical mention which largely gives the word "extinct" its meaning, and which in Europe reaches back 2000 years at once, has here as yet but a proved retrospect of hardly more than three centuries. The fact that John Smith or the Jesuits did not observe the peccary in the northern United States does not disprove its scanty or straggling existence in their time, and we cannot be certain that, as Jefferson supposed, a few superannuated mammoths were not hiding in forest corners as late as the 18th century. Only the correlation of the faunas of many more caves with human remains can give us a just notion of the time-span of many of these animals and make definite the still vague border line between archæology and paleontology.

Das Neue Ausland furnishes the information that there were in Japan at the beginning of the present year 42,899 physicians, 2836 apothecaries, 13,245 dealers in drugs, 128 public and 378 private hospitals. There is, therefore, one physician for every nine hundred inhabitants.



TAKU GLACIER, ALASKA.

THE PETRIFIED FOREST OF ARIZONA.*

S. A. MILLER.

THERE is an extensive tract of land in the eastern part of Arizona, south of the Union Pacific Railroad, called the "Petrified Forest," though it is not a forest of petrifactions; and it has even been more erroneously called "Chalcedony Park," though it is not a *park* in any sense of the word. Those who visited the World's Fair saw polished specimens of the petrified wood in the exhibits of Arizona and South Dakota.

I spent several days on this tract of land, and will attempt to convey to those who have not had such an opportunity some impression of it. First, cast out of the mind the idea of a forest, for there is none there, then follow my imagination of what may have taken place to produce the fossil wood, and possibly I can make myself understood in describing the present appearances.

Suppose there had been a lake or bay in that area, bordered on one side with a sandy plain bearing pine trees, and on the other side with volcanoes, in some comparatively recent geological age. We know there were volcanoes, for we can see lava distributed over hills and valleys for hundreds of miles in extent. We know there was a lake or bay, for sand, and gravel, and bowlders, that are made by the action of water in rolling broken stone, are found in great abundance. We know there were pine trees, for we find fragments of the fossil trees in many places. And we conclude that the pine trees grew in a sandy plain, not only because such trees flourish best in a sandy soil, but because the fossil trees, where undisturbed by the modern denudation of the country, are encased in a sandstone matrix.

Suppose now, that, through volcanic or earthquake action, the pine trees were uprooted, prostrated, submerged beneath the waters, and buried in the sand, until they were subjected to the slow process of fossilization. The water must have contained silica instead of lime, in solution, for the trees are silicified. If the water was heated by reason of its proximity to the volcanoes, may be the fossilization was accelerated. The fossil wood is chalcedony, more or less translucent, and of all shades and colors. No two pieces are shaded alike, and none are banded as agates. The delicacy of the tints is remarkable, and the material is used as a gem and an ornament. It would be only fair, therefore, to suppose that heated water aided and accelerated the fossilization. The coloring matter was probably from iron and copper, but, generally, the coloring is presumed to have the tints of iron.

During the period of fossilization, the sand in which the trees were embedded was cemented so as to form a hard, compact sandstone. Subsequently, through volcanic or earthquake action, the sandstone was elevated, and the lake or bay was drained. The prostrate trees and parts of trees that had been thus transformed by fossilization into chalcedony were held in a matrix of less hardness and more flexibility than the chalcedony. After that time, the trees could not accommodate themselves to the tremulous motions of the earthquakes as freely as the sandstone could, and the result was that they were broken into short sections or shaken into pieces while embedded in the matrix.

Since that time denudation from the wear and tear of the elements has played an important part in sculpturing and draining the territory. Generally, the sandstone containing the broken trees, which is only a few feet in thickness, constitutes the summit of the outliers, or less than one-twentieth of the country over which the fragments of the trees are distributed. The country is eroded, between the outliers, from twenty to sixty feet, while the tops of the outliers, if connected, would appear almost one continuous plain. Or, describing the appearance in another way, the surface of the country is rolling, except that it is interrupted here and there with more or less abrupt and irregularly defined outliers, that indicate about the level of the country before the denudation that has taken place in the present geological age. The chalcedony, being imperishable under the action of the elements, and too heavy for the ordinary rains to carry away, has remained in the eroded areas and valleys, while the lighter materials have been transported.

Now, standing on one of the outliers and looking across or up one of these eroded valleys, we see, in one direction, scattered here and there, the broken fragments of this chalcedonized wood glistening in the sunlight; in another direction, clusters of the short sections of the trees, coated with dark oxyd of iron, that look like veritable logs; and in another direction, where the oxydized sections have rolled together and are still more numerous, they look like the logs sometimes seen on imperfectly cleared fields. The trees may have been two, three, four or five feet in diameter, but it is very rare to find an unbroken piece four feet in length. I saw one log in place about one hundred and fifty feet in length, but it was so shattered that a good section could not be found in it three feet in length. Sections two feet or less in diameter are generally solid, while those three or four feet in diameter are usually defective, indicating the presence of decayed places in the tree, and some of the larger pieces seem even to represent a hollow tree. Possibly the trees may have been shaken and injured, as so perfect has the petrification been that the defects are preserved, as well as the internal structure of the trees themselves.

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* Read before the Cincinnati Society of Natural History.

THE LIFE OF THE DEEP SEA.—ITS ORIGIN AND CHARACTERISTICS.

THE FAUNA OF THE DEEP SEA.—By Sydney J. Hickson, M. A. New York: D. Appleton & Co., 1894.

IN a conveniently compact volume of 170 pages, Dr. Hickson summarizes our present knowledge regarding the fauna of the oceanic abyss. A little more than a half century ago this knowledge had hardly begun to exist, for while certain facts were known at a considerably earlier period, they were so opposed in their tendencies to what were thought to be the fundamental conditions governing organic life that they were given but scant credence—indeed, were completely denied by many naturalists. It was assumed that the limit of life rested within a few hundred fathoms of the surface; to-day we know that a fairly rich fauna descends to very nearly the greatest depths of the sea. To Sir James Ross, the distinguished Arctic and Antarctic explorer, to whom the world is indebted for the location of the North Magnetic Pole, seemingly belongs the credit of having, first among scientists, convincingly stated the proposition that life exists at all depths, and to have thereby anticipated the discoveries of more recent years.

The special negative conditions, if so they may be called, which govern the life of the deep sea are: the absence of solar illumination and enormous pressure. To quote from our author: "At a depth of 2500 fathoms the pressure is, roughly speaking, two and a half tons per square inch—that is to say, several times greater than the pressure exerted by the steam upon the piston of our most powerful engines. Or, to put the matter in other words, the pressure per square inch upon the body of every animal that lives at the bottom of the Atlantic Ocean is about twenty-five times greater than the pressure that will drive a railway train." Apparently the only source of illumination in the greater depths is that derived from the phosphor light which is emitted by many of the deep-sea organisms, especially the fishes. As might naturally have been expected, the absence of ordinary illumination stands in material relation to a distinct coloration of the animal tissues, which in itself is almost sufficient to characterize the dark fauna. On this point, and with regard to the effect which the absence of light has upon the visual organs, Mr. Hickson writes as follows:

The fauna of the deep sea then, taken as a whole, is not characterized by the predominance of any one color. The shades of red occur rather more frequently than they do in the fauna of any other zone or region, but whether this is in any way connected with the fact that red is the complementary color to that of the phosphorescent light, in which many of these animals live, it is at present difficult to say; it is possible that, when we have further information concerning the colors of the animals living in the deeper parts of the neritic zone, another explanation may be forthcoming.

Moseley points out that there are no blue animals known to live in deep water, and it might be added that green is extremely rare as a coloring matter in abysmal animals, although the phosphorescent light given out by some of the echinoderms is green.

Blue, as a coloring matter of marine animals, living on the surface or in shallow water, is not uncommonly met with, distributed in the form of bands or stripes, but green is extremely common in fishes, crustacea and cœlenterates, and it is a point of very considerable importance that in this respect there is a very great difference between the deep-sea and the shallow-sea faunas.

If a considerable collection of living abysmal forms could be placed upon one table and a similar collection of shallow-water forms upon another, I believe that the first general impression upon the mind of one who saw them both for the first time would be the presence of green color in the last-named collection, and the absence of it in the other.

In the majority of cases we find that the eyes are either very large or very small. Only in a small minority of cases do we find that the eyes are recorded to be moderate in size. The relation between the large-eyed forms and the small-eyed forms is not the same in all the regions of deep seas. In depths of 300 to 600 fathoms the majority are large eyed forms. This is as we should expect, for it is more than probable that many of these forms occasionally wander into shallower waters where there is a certain amount of sunlight.

In depths of over 1000 fathoms, the small-eyed and blind forms are in a majority, although many large-eyed forms are to be found.

The anatomical modifications of the deep-sea animals are largely involved in a loosening of the tissues and in the small quantity of lime that is secreted by them.

" In fishes we are told that the bones have a fibrous, fissured and cavernous texture, are light, with scarcely any calcareous matter, so that the point of a fine needle will readily penetrate them without breaking. In some the primordial cartilage is persistent in a degree rarely met with in surface fishes, and the membrane bones remain more or less membranous or are reduced in extent, like the operculum, which is frequently too small to cover the gills.

" Then again, the shells of the deep-sea lamellibranchs, gasteropods, brachiopods, and crustacea are very frequently remarkably thin and transparent, a character that is probably more generally due to a weakness in absorptive or secretive activity than to a deficiency in the supply of lime."

Mr. Hickson thus emphasizes the broader bearing of the discoveries which the faunal exploration of the deep sea has brought out:

" The most important, but perhaps somewhat disappointing, result of the deep-sea researches of recent years has been to prove that the abysmal fauna does not possess many extraordinary forms.

" It seemed probable, before the dispatch of the *Challenger* Expedition, that when the dredge and the trawl should be successfully employed in depths of over 2000 fathoms, a new and remarkable fauna would be brought to light. Some naturalists thought it even possible that, not only would many genera be found alive that are known to us only by their fossilized skeletons in the secondary and tertiary rocks, but that there might be many other new creatures whose anatomy would throw much light on the theories of the evolution of the animal series.

" But none of the great expeditions that have sailed since the year 1874 have yet succeeded in showing that the hopes and wishes of these naturalists were really justified. Although thousands of species of animals have been described in the volumes that have been devoted to deep-sea work, the number of the sub kingdoms and classes remains the same, and indeed the number of new families and genera has not been increased in any very unprecedented manner.

" We have found no animals in the depths of the sea of such interest and importance as ornithorhynchus, amphioxus, balanoglossus, peripatus, millepora, or volvox among the living, or hipparion, archæopteryx, ammonites, slimonia, and the trilobites among extinct animals.

" The abysmal fauna is not in fact remarkable for possessing a large number of primitive or archaic forms. It is mainly composed of a number of species belonging to the families and genera of our shallow-water fauna that have, from time to time, migrated into greater depths and become modified in their structure in accordance with the extraordinary conditions of their new habitat.

" There is very good reason to believe that this migration has been going on from time immemorial, and consequently we find a few forms typical of the bygone times, left to struggle for existence with the more recent immigrants from shallow waters. But after all, the proportion of ancient forms to modern ones in the fauna of the abyss is not larger than it is in the fauna of fresh-water lakes and streams or even of the dry land. Nor is there any reason why it should be. The land and the fresh water have been peopled by migrations from the shallow water of the sea from generation to generation in precisely the same way, and they each can show a certain number of archaic forms."

Summarizing our as yet very defective knowledge regarding the origin of this singular life of the oceanic abyss, Mr. Hickson expresses himself in accord with the greater number of naturalists who hold that the deep-sea fauna is primarily a development, through slow immigration and modification, of the faunas of the littoral or shallow seas. His position is thus clearly stated:

"Whence came the curious creatures that live mostly in total darkness and can sustain without injury to their delicate and complicated organization the enormous pressure of the great depths? Are they the remnants of the fauna of shallow prehistoric seas that have reached their present position by the gradual sinking of the ocean basin? Or, are we to look upon the abysmal region as the nursery of the marine fauna, the place whence the population of the shallow waters was derived? Neither of these answers is supported by the facts with which we are now well acquainted. The fauna of the abysmal region does not show a close resemblance to that of any of the past epochs as revealed to us by geology, nor are we justified in assuming, without much stronger evidence than we now possess, that the oceans have undergone any such great depression as this first theory presupposes.

"Nor can we consider for a moment that the abyss was the original source of the shallow-water fauna; for not only do we find but few types that can be considered to be, in any sense of the word, ancestral in character, but on the contrary, most of the animals of the deep sea seem to be specially modified types of shallow-water forms. The most probable explanation of the origin of the deep-sea fauna is the one that was put forward by Moseley and has been since supported by almost every authority on the subject, namely, that the fauna of the deep sea has been derived from successive immigrations of the animals from the shallow water"

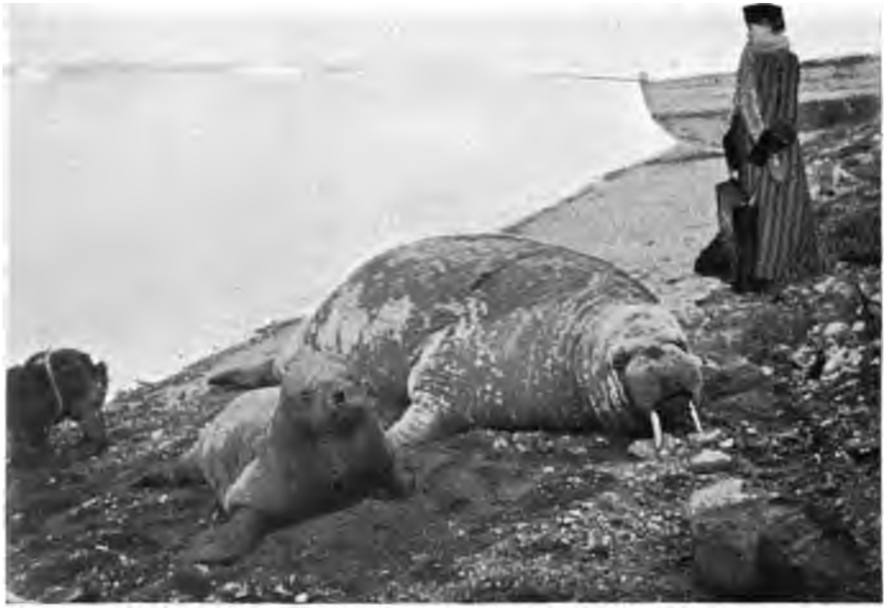
EDIBLE EARTHS.

IT is common knowledge that certain peoples, more particularly of tropical countries, find a part of their daily sustenance in the inorganic particles of earths and sands, but it is not generally known how widespread this custom of earth-eating is. For a long time it was assumed that the Ottomacs, a tribe of Indians on the Orinoco, whose customs were first studied by Alexander von Humboldt, were the only people who indulged in this singular habit, and they are frequently referred to as an exceptional tribe of clay-eaters: but the closer study of mankind shows this habit to belong to no particular portion of the earth's surface (although most prevalent in the tropics) and to no special class of its inhabitants. The latest edition of Meyer's "Konversations-Lexikon" furnishes some interesting facts in this connection. It would appear that women are even more addicted to the habit than men, and in the case of many the habit becomes an irresistible passion, doubtless made such through conditions of necessity. The Ottomacs, just referred to, during recurrent periods of from two to three months, when their country is devastated by floods, and hunting and fishing are rendered all but impossible, subsist largely upon a fine gray and unctuous clay, which is subjected to a partial process of "cooking" or heating over a fire. It is asserted that 125 grammes of the material is the daily allowance for each person, yet despite this heavy consumption the people remain strong and healthy. The Indians of the Bolivian plateaus use a somewhat similar earth, to which a fair proportion of sand is added; and the same practice is found repeated in several islands of the West Indies. A number of the African tribes, more particularly those of the Guinea coast, are earth-eaters, and in the days of slavery their representatives in the United States sought the practice quite extensively.

The inhabitants of New Caledonia might, indeed, almost be called rock-eaters, since in their dietary selection they even resort to stalactitic crusts. Perhaps nowhere is earth-eating more general than in Persia, but it is mainly as an assistant to proper digestion and salivation that the practice is there indulged in. Edible earths are also familiar to the "lower estate" of Scandinavia and Germany; in the sandstone quarries of the Kyffhäuser Mountains the workmen actually spread over their bread a fine clay in place of butter, and know this singular food under the very appropriate name of stone-butter. It is also pointed out that certain animals, such as the wolf, reindeer and stag, follow the example of man in accepting the inorganic foods as part of their diet.

THE ARCTIC SHORE.

NOT for many years has there been so much activity manifested in Arctic matters as during the present year; indeed, perhaps at no time has the weird



ON THE ARCTIC SHORE.—MRS. PEARY AND WALRUS.

problem of the north enlisted in its resolution that varied energy and force which are represented in the several expeditions which are to-day working to a common end, and from which news is so anxiously awaited. With the passing of the summer months we shall, doubtless, be put in closer touch with the Arctic problem, for at that time it is all but positive that at least one of the expeditions will have safely returned to civilized shores, and it may be that by that one expedition the keys to the problem are held for safe keeping. Mr. Peary's brilliant achievement in 1892 has raised high hopes for his latest venture, and it can be only through the uncertainties of Arctic travel that these hopes may not be realized. What Mr. Peary's conquest will be it is hard to prophesy, yet it is almost safe to say that, unless some untoward disaster has early overwhelmed his party—which there is no reason to suppose—he will have attained a higher northing than has ever been attained before, and not impossibly he will have far eclipsed his predecessors. His work is not, however, a simple "north conquest," and this is, indeed, secondary to the acquisition of sound knowledge, in its various avenues, regarding regions which are as yet little known and which appeal to the knowledge-seeker through their own obscurity.

The magnificent equipment of the Jackson—Harmsworth Expedition holds out strong hopes for success in the region of Francis-Joseph Land, but the present summer will see only the outlines of this expedition traced. Fortune has well turned its wheel against Mr. Wellman, and only a most strenuous effort, combined with most favorable conditions of Arctic travel, can recover for that plucky leader what has been lost, both in time and material, through the unfortunate disaster which befel the relief vessel of the expedition, the *Ragnald Jarl.* In the calm and quiet days of summer it is hard to realize the existence of angry moods even in the Arctic waters, so much like peace and contentment does the world of nature then appear. The battles of the elements are then over, wind and storm have subsided, and the gentle leaven of all-rest has seemingly settled over the landscape. But angry forces still lurk within the quiet deep, and only too powerfully do they at times do their work. The crushing by ice is the calmest and quietest of all powerful work.

We illustrate in this number the shores of McCormick Bay, the scene of Mr. Peary's headquarters in 1892, as they appeared in the full beauty of an Arctic summer day, when the landscape was aglow with flowers, and busy butterflies hovered among their sweets.

NOTES ON MOUNTAINS AND MOUNTAINEERING.

NORTH AMERICA'S HIGHEST MOUNTAIN.—The reported discovery in Alaska of a cluster of mountain peaks which considerably overtop St. Elias again opens up the interesting question as to which summit is the actual culminating point of the North American Continent. For many years prior to 1890 St. Elias, with a reputed elevation of approximately 19,500 feet, held undisputed possession of this claim to supremacy, but in that year a remeasurement of the Star Mountain (Citlaltepetl, or Peak of Orizaba) of Mexico, and a critical examination into the resolution of the St. Elias measurements showed that the Alaskan giant had at least a close competitor. The increased altitude given to the Mexican volcano (18,200–18,300 feet)—a determination first made by barometer and subsequently confirmed by angular measurements—and a more than corresponding reduction from the height of St Elias which the survey of Mr. Russell made necessary, placed the two mountain peaks in a closely competitive position, with the advantage slightly in favor of the Mexican volcano. It is now asserted that the mountains upon which Mr. Russell has bestowed the name of Mount Logan, and whose lofty existence was made apparent during the work on St Elias, have an elevation exceeding St. Elias by at least 1300 feet and the Peak of Orizaba by 1200 feet. If this determination is correct, then to this mountain belongs the honor of first position; but it will probably be well to await further observations before definitely accepting the result now put forward. Too many of the American mountains have suffered in height through a process of sudden decapitation, and not improbably this one will share the fate of some of its predecessors.

FATIGUE AND MOUNTAIN SICKNESS.—Apropos of the mountain railroad to the summit of the Jungfrau which is shortly to be carried into execution, and the question of effect which a sudden elevation into a region of rarefied atmosphere is to produce upon the ascensionist, M. Regnard has conducted a number of experiments intended to determine the nature of mountain sickness and to ascertain, if possible, the conditions under which the malady specially presents itself. Using guinea-pigs under a bell-receiver, with one put to continuous work in a revolving "squirrel cage" and the other free to remain in a condition of rest, it was found that with the density of the air reduced to the equivalent of 3000 metres elevation no appreciable difference in the disposition of the two animals could be determined, both of them being perfectly normal. With a further reduction of the atmosphere the wheeled guinea-pig began to tumble repeatedly, and at 4000 metres it became stretched, seemingly insensible, on its back. The free animal, on the other hand, scarcely exhibited any signs of distress, and only at the equivalance of 8000 metres was it thrown into the condition of its caged and tortured associate. M. Regnard concludes from his experiments that while mountain sickness is due primarily to a deficiency in the blood-stimulating oxygen of the atmosphere—producing through its effect upon the blood a form of asphyxia—its special occurrence is brought about or induced by muscular exercise. Without the latter little or no discomfort would be experienced—a conclusion which is not absolutely in accord with the sensations of those who have unsuccessfully tried to habituate themselves to quiet residence in elevated regions. He asserts, therefore, that the sudden elevation by the railroad, inasmuch as it involves no individual muscular exercise, will neither be disagreeable nor dangerous to the tourist.

TURBIA ON THE CORNICHE ROAD.—The steady progress of the cog mountain railroad is evidenced by the new constructions which are yearly being planned and executed. A road has just been opened between Monte Carlo and Turbia, the rock-hamlet on the Corniche Road, which, from a ragged eminence of very nearly 1500 feet, looks proudly down upon the blue Mediterranean and the silvery-dusty olives which climb up from its banks. Turbia commands one of the finest panoramas of the Riviera, and many tourists will doubtless take satisfaction from the comfort which this effacement of nature brings to them in gaining another point of view. The field of vision extends from beyond Nice, on the west, to Bordighera, San Remo and Ventimiglia, on the east, and inwards to the snow-clad summits of the Maritime Alps; Monte Carlo, with its wealth of vegetation, and glittering in the full light of an Italian sunshine, lies below. The steepest gradient of the new road is 1 in 4.

THE NAMES OF ALPINE SUMMITS.—Herr A. Wäber publishes in the *Jahrbuch des Schweizer Alpenclub* an interesting paper upon the nomenclature of the Bernese Alps, showing that many of the better-known names of mountains appear in geographical literature only since the latter part of the last century. Thus, for example, while the Jungfrau, Eiger, Schreckhorn, Mettenberg and Wetterhorn appear as such already on Schöpf's map of 1577, the Mönch appears definitely for the first time in 1690 (so named by Studer), before which it was variously known, as an appendage to the Eiger, as Eigers Schneeberg, Inner Eiger, Eigers Breithorn. The Berglistock, Blümlisalp, Breithorn, Finsteraarhorn, Lauteraarhorn, Schwarzhorn, Tschingelhorn, and Wildhorn all date subsequently to 1750. Although, as before remarked, the name Jungfrau appears in its modern designation as far back as 1577, yet it would appear that two full centuries later its identity had been in a measure lost, and we find the names of *Vordere Jungfrau* and *Hintere Jungfrau*, with designations, possibly, of the modern Mönch and Silberhorn. The mountain peak whose name appears to have been first permanently established is the Eiger reference to which as "Eiger" or the "Mons Egere," is contained in state archives bearing date of 1252; the Scheidegg is mentioned at the same time. According to Herr Wäber the geographical literature of Switzerland begins with the year 1478, with a publication by Albrecht von Bonstetten.

THE AUSTRALIAN ALPS.—A redetermination of altitudes of the Snowy Mountains of Australia, which has recently been completed by Mr. Joseph Brooks, of the New South Wales Trigonometrical Survey, re-establishes Mount Kosciusko as the highest summit of the continent. For many years the mountain enjoyed this position undisturbed, but latterly it had been assumed that Mueller's Peak overtopped its position by a few feet, and hence became the recipient, through pilgrims' devotions and homage, of "record effects" in the shape of tins containing visiting-cards, scraps of paper, addressed envelopes, etc. This latest measurement gives Mount Kosciusko, in lat. 36° 27′ 26″, 7336 feet, and its close rival 7268 feet. Both peaks are, consequently, but little higher than the Pilatus, in Switzerland.

Snow-Shoeing in the Alps.—It seems not unlikely that the "Ski," or Norwegian snow-shoe (more properly snow-skate), is shortly to enter as a permanent element into the appliances of Swiss mountain travel, even if the first extended experiments with it cannot be said to have proved particularly successful. Herr Claudio Saratz, an experienced snow-shoer, latterly made the traverse of the Bernina Pass from the Hospice to Poschiavo, a distance of somewhat more than eleven miles, in one hour and twenty minutes—what would be considered to be an exceedingly expeditious journey. A return tour from Pontresina, *via* the Fuorcla Surley, to Silvaplana, involving an ascent to an elevation of 9000 feet, occupied, however, the same amount of time as would be required for the journey by a good pedestrian in summer. Practice will, doubtless, improve the time-record.

A Cog-Railway to the Schneeberg.—The Vienna *Neue Freie Presse* furnishes the information that the Schneeberg, which is held so dear to the Austrian tourist, is shortly to be made accessible through a cog road. The project of Engineer Tauber, which contemplates a departure of the main line from Wiener-Neustadt, has received the hearty approval of the Municipal Council of that city, which contributes a subvention of 50 000 florins to the undertaking. As early as 1873 a plan for compassing the summit of this mountain by rail had been proposed, but no steps looking toward its accomplishment had been taken until the present year. The cog portion of the railway, which follows in construction the system now in use on the Rigi, passes out from Schneebergdörfel over the Öchsenboden to the Damböckhaus, at an elevation of approximately 5900 feet (almost exactly that of the Rigi-Kulm). The summit commands a panorama of surpassing magnificence.

NOTES.

Scylla and Charybdis —The British *Geographical Journal* furnishes the following commentary upon a paper recently published in *Globus* by Dr. Schott: Amongst the many natural phenomena which have in these days lost much of their terror, but little of their charm of historical interest, are the famous tidal whirlpools at the entrance to the Strait of Messina. Recent revisions of the Italian charts finally prove them to be insignificant, although doubtless at certain seasons they were a source of real danger to the small ships of ancient times. The currents of the Strait of Messina, however, offer many peculiarities, and the "remarks" appended to the chart just mentioned illustrate some anomalies in the behavior of tidal streams in a manner likely to throw light on many cases where the conditions are more complex. The latest surveys have cleared up a number of doubtful points not settled at the time of publication of the "Mediterranean Pilot," and corrected some errors in the work of the German surveyor, Keller. In a recent number of *Globus*, Dr. Gerhard Schott gives an excellent summary of present knowledge of this subject, with charts showing the surface circulation during ebb and flood tides. The cause of the relatively strong current—which attains a maximum speed of five and a half miles an hour—is almost solely the configuration of the coastline and of the sea-bottom. High water occurs in the Ionian Sea at the time of low water in the Tyrrhenian, and conversely, but with the feeble tides of the Mediterranean the maximum range at Messina does not exceed ten and a half inches to one foot. The flood stream, which runs northward through the strait, begins in the upper and narrower portion about two hours after the moon crosses the meridian of Faro, at Messina two hours later, and two hours later still it is running through the whole channel. The ebb current, entering the narrow opening between Scylla and Punta Peloro, tends to cross and recross from side to side of the strait, at least as far down as Reggio. Where the irregularities of the coast-line form a bay sweeping back from the main channel—as between Faro and Messina on the Sicilian side, and Catona and Reggio on the Calabrian—back currents, locally termed *Bastardi*, are found, extending from the shore outwards for over half a mile. These currents always run in the opposite direction to the tidal streams, and are obviously extremely useful to navigators; they show very clearly on a small scale the influence of certain forms of coast-line upon the arrangement of tidal currents, an effect very often so disguised as to be scarcely recognizable, as for example in the English Channel. The whirlpools of Scylla and Charybdis are probably whirls set up at the interfaces between the *Bastardi* and the tidal streams. But, unlike the Corryvreckan, they are by no means easy to locate.

DEATH RATE IN EUROPEAN CITIES.—The Imperial Sanitary Bureau of Germany has recently published some interesting data regarding the death rate in some of the principal European cities. From these it would appear that Berlin, in which the mortality is 16.3 per 1000 (and *not* London, as is still generally assumed), is the healthiest of European cities. Stockholm follows with 16.9 per 1000, and Christiania with 19. London and Paris with 20.5 hold approximately equivalent positions. Of the Italian cities, again contrary to common belief, Venice leads Rome in the value of 30.1 to 27.6. According to the same report the unhealthiest of all the large cities of the world is Alexandria, in Egypt, in which the mortality rate rises to the prodigious figure of 52.9.

ANTARCTIC EXPLORATIONS.—At the meeting of the Geographical Society of Hamburg, held on the 5th of April, the Secretary communicated to that body the results of exploration of the three whalers, *Jason*, *Hertha* and *Castor*, in the region of Graham Land, almost due south of the Falkland Islands. On November 2, 1893, the *Hertha*, on the western side of Graham Land, attained in latitude 69° the highest position that has hitherto been reached by steam vessel in the Antarctic realm. The *Jason*, on the opposite side, penetrated, on the 6th of December, to 68° 10′, and discovered many new lands and islands, the positions of which had barely been suspected by geographers, and to which the names of King Oscar II Land, Weather Islands (lat. 66° 10′ S.), Robertson, Christensen and Lindenberg Islands were applied by Captain Larsen. Christensen and Lindenberg Islands were volcanoes in activity at the time of the visit. North of the first-named is another group of five islands (Sea Lion Islands). The observations of Captain Larsen would seem to indicate that what has hitherto been known as Graham Land is in the nature of an archipelago rather than of a united land-mass.

THE WELLMAN EXPEDITION.—The many friends of Arctic exploration will regret to learn of the disaster which has overtaken the *Ragnald Jarl*, the vessel which conveyed the Wellman Expedition to Spitzbergen, and was to have returned the party to civilization after the completion of their northern ice journey. It would appear that the crushing of the vessel by ice took place four days after the landing (May 24th) of the leader of the expedition on Walden Island, to the north of Spitzbergen (80° 37′ N.), whence the great ice traverse for the "farthest north" was to begin. Mr. Wellman, who was provisioned for 110 days, was accompanied by thirteen men and forty dogs, and when overtaken by messengers acquainting him with the disaster that had overtaken his vessel had reached Marten's Island.

With an energy and rare determination worthy of the highest admiration, the commander prepared to repair the tide of his misfortunes, and returning to Walden Island built from the wreck of his vessel a depot for the shelter of his crew and stores. On May 31st, he was once more on his northern journey, and up to the latest reports, bearing date of June 17th, he and his party were in good condition. The condition of the ice was seemingly much more unfavorable than was anticipated, and progress has been provokingly slow. With the lateness of the final departure, and the necessity for an early return, it can hardly be expected that a high northing will be accomplished, but even if in this respect the expedition may prove a failure, it will have served a purpose in testing an old route with new methods and appliances. It is as yet hardly safe, however, to prophesy the full result of the expedition, and its friends will continue to hope for the best. Reports do not state just how the *Ragnald Jarl* was beset in the ice, nor is it made clear why the vessel should have lingered the four days on the edge of the ice-pack after the departure of the expedition; caution, seemingly, should have directed an early return to Danes Island. The captain and three of the crew of the ill-fated vessel were picked up by the *Malygen*, a Norwegian fishing boat, and landed in Tromsö on August 3d.

A PECULIAR horse disease has recently broken out in the district of Carnarvon, in Cape Colony, Africa. It seemingly affects only horses with white feet and those that are mottled white, and the actual seat of the trouble is only in the regions which are marked by the growth of the white hairs.

Around the World.

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MOUNT ROYAL, FLORIDA.

CLARENCE B. MOORE.

THE mounds of the Floridian peninsula, which have from time to time attracted the attention of archæologists, have acquired new interest through the recent very extensive explorations of Mr. Clarence B. Moore, of Philadelphia, who has unearthed an amount of material from them that has been wholly unexpected. In a communication addressed to the Academy of Natural Sciences he thus describes the vast tumulus of Mt. Royal:

On the east bank of the St. John's, just below where the river leaves Lake George, in a great grove of bearing orange trees, not 300 yards from the water's edges, stands Mt. Royal. Its owner, David Wright, Esq., of Auburn, N. Y., fully appreciating the interest attached to this famous monument, whose makers now are nameless, has long followed the example set by former possessors of the St. John's largest mound, and kept it intact, carefully guarding it against the depredations of unsystematic relic hunters. Mt. Royal then, prior to our visit (April, 1893), knew no explorer other than the gopher, the salamander and the scarlet snake.

For 128 years the existence of Mt. Royal has been a matter of history. The elder Bartram, a Philadelphia Quaker, on his way down the St. John's, January, 1766, stopped at Mt. Royal. Under date of the 25th he writes: "About noon we landed at Mt. Royal, and went to an Indian tumulus, which was about 100 yards in diameter, nearly round, and nearly 20 feet high, found some bones scattered on it, it must be very ancient, as live oaks are growing upon it three feet in diameter; what a prodigious multitude of Indians must have labored to raise it? to what height, we can't say, as it must have settled much in such a number of years, and it is surprising where they brought the sand from, and how, as they had nothing but baskets and boards to carry it in; there seems to be a little hollow near the adjacent level on one side, though not likely to raise such a tumulus the fiftieth part of what it is, but directly north from the tumulus is a fine straight avenue about 60 yards broad, all the surface of which has been taken off, and thrown on each side, which makes a bank of about a rood wide, and a foot high, more or less, as the unevenness of the ground required, for the avenue is as level as a floor from bank to bank and continues so for about three-quarters of a mile to a pond of about 100 yards broad and 150 yards long, N. and S., seem to be an oblong square and its banks 4 feet perpendicular, gradually sloping every way to the water, the depth of which we could not say, but do not imagine it deep, as the grass grows all over it; by its irregularity it seems to be artificial; if so, perhaps the sand was carried from hence to raise the tumulus, as the one directly faces the other at each end of the avenue; on the south side of the tumulus I found a very large rattlesnake sunning himself, I suppose this to be his winter quarters; here had formerly been a large Indian town; I suppose there is fifty acres of planting ground, cleared, and of middling soil, a good part of which is mixed with small shells; no doubt this large tumulus was their burying place or sepulchre; whether the Florida Indians buried the bones after the flesh was rotted off them, as the present southern Indians do, I can't say; . . . . ."

Shortly before the Revolutionary War, the younger Bartram (William) went up the river about as far as what is now called Lake Beresford, passing a night at Mt. Royal. The place had been under cultivation, which was not the case when John Bartram went up the river. "At about 50 yards distant from the landing place," he writes, "stands a magnificent Indian mount. . . . But what greatly contributed towards completing the magnificence of the scene was a noble Indian highway, which leads from the great mount, on a straight line, three-quarters of a mile, first through a point or wing of the orange grove and continuing thence through an awful forest of live oaks, it was terminated by palms and laurel magnolias on the verge of an oblong artificial lake which was on the edge of a green level savanna. This grand highway was about 50 yards wide, sunk a little below the common level, and the earth thrown up on each side, making a bank of about 2 feet high."

The good Quaker bemoans the change wrought since a former visit by the felling of the trees, but added that "the late proprietor had some taste as he has preserved the mount and this little adjoining grove inviolate." In 1872 Prof. Jeffries Wyman visited Mt. Royal while engaged in his researches among the shell heaps of the St. John's. The avenue to the lake was then overgrown with forest trees. These forest trees have now been largely cleared away, leaving here and there a scattering pine, and the ground has been under cultivation. The avenue is still readily traceable, though its point of union with the mound is no longer visible. Its course is north about half a mile to the pond, where water-lilies were in flower at the time of our visit. It consists of a depression from 12 to 20 yards in width at different points, between embankments and sand, with an average height of 2.5 feet, and 12 feet in breadth.

Mt. Royal has been under cultivation, and consequently by the wash of the summer rains a considerable quantity of sand from the sides has so raised the level of the territory immediately surrounding, that measurements taken from the apparent base to the summit are diverse and misleading. Its true height from the summit plateau to the base, as shown by measurement at the center of the mound, is 16 feet; the circumference is 555 feet. It is composed of the yellow sand of the surrounding fields, with pockets and local layers of white sand along and above the base. Wherever exposed, the sand at the bottom of the mound was found mingled with pieces of charcoal. . . . In the southern portion of the mound, 12 feet from the margin of the base, a trench following the base 89 feet in length was dug. Its breadth at the beginning was 12 feet, widening after a few feet to 30 feet, again decreasing to 25 feet, the last 26 feet having a breadth of from 37 to 40 feet. Owing to the unstable nature of the sand, a considerable convergence to the sides was requisite; so that even at the broadest portion of the trench the surface of the base exposed had a breadth of but 12 feet. Starting from the northern side of the mound, 13 feet from the margin of the base, a trench 36 feet in breadth was dug along the base a distance of 21 feet. This trench when discontinued had a depth of 8 feet. In addition to these trenches a great portion of the surface of the mound was dug over to a depth of 7 feet.

That Mt. Royal was erected for purposes of sepulture is beyond a doubt. In every portion of the excavations, though at considerable distances apart, signs of burials were met with, though meagre and incomplete. In no mound of the St. John's have human remains been found so fragmentary through the ravages of decay, and it is probable that traces of many burials have entirely disappeared. In certain cases human remains were represented by hardened sand retaining nothing but the shape. Many fragments of bones resembled moistened powder and crumbled at the touch. Beyond a few crowns of teeth no remains were saved. It is probable that an admixture of shell with the sand of the mound would have preserved the bones to a material extent.

COREA.*

PROF. A. KIRCHHOFF.

THE events of to-day have suddenly directed general attention to Corea, a land which has heretofore been gracefully given over to the geographer. Science until recently knew little of this closed-off region, and only of late have some of the facts of its individuality been made accessible; but even at the present hour little more than nothing is known.

The peninsula of Corea is the connecting land-bridge between Japan and Manchuria and China. Of about the extent of Great Britain, it occupies a nearly north and south position between Japan on the east and north China on the west; consequently it is a more southerly country than is generally assumed.

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* Translated from *Das Neue Ausland*.

Placed in the longitude of western Germany, it would stretch from the Tunisian desert in Africa to the northern extremity of Corsica. Florence accordingly occupies a position farther to the north than the extreme north of Corea. This region seemingly represents one of the most ancient sections of the earth's surface, being made up almost entirely of granite, gneiss, and the oldest crystalline schists. A lofty, though not yet Alpine, mountain range follows the east coast for nearly the entire length of the peninsula, falling off westward into low foothills, in which the principal watercourses, navigable for the most parts only near their mouths, have their source. There are no elevated plains or plateaus. Seoul, the capital, which is situated almost centrally on the west coast, and whose population is about double that of Halle, occupies the same position relative to the sea-level that does Berlin, although within its walls the granite and gneiss domes rise to nearly 1300 feet elevation.

Although placed latitudinally with south Italy and Greece, Corea does not enjoy the mild winters of the European south ; neither does it suffer from the summer droughts of the Mediterranean region. The frosty winter storms which pour over the peninsula have their origin in the coldest track of the globe, and in their path mountain and valley are deeply buried in snow ; the rivers remain frozen for upwards of four months of the year. With the advent of the summer monsoon, in the month of April, bringing with it the balm of more southerly climes, nature revivifies with heat and torrential rains. Chemulpo, the port of Seoul, which lies on the latitude of Seville, has the average yearly temperature of Halle, in Germany, but a January of the intensity of that of Hammerfest or Tromsö, in Norway, and a July and August as hot as in Palermo.

In its vegetable and animal productions the region differs largely from Japan; the protracted and severe winters, as in northern China, permit of no palm growth, nor do monkeys form a part of the fauna of the land. Even the evergreen oaks give precedence to the conifers, and what little remains to recall the ancient splendors of the Corean forest is found almost entirely among the pines. Only about the royal graveyards and the Buddhist temples, here and there also in the less acçessible spots of the country, does the forest still show a primitive magnificence. There is little or no undergrowth, the stately trees—oaks, alders, beeches, lindens, poplars, etc., and higher up the firs, larches, and birches—suggestively reminding the traveler of the German forests. Familiar forms, such as the common fox, the brown bear, squirrels, the cuckoo, raven, buzzard, etc., also appear in the fauna, which, however, includes a variety of distinctly non-European types, such as the tiger, the Japanese bear and deer, musk-deer, a variety of herons and cranes, the red ibis, etc.

As both sexes smoke from childhood on, tobacco is the great staple of cultivation, and it is grown throughout the land; to the influence of the same genial summer sun which favors the cultivation of the tobacco is due a considerable harvest in cotton, rice, maize, sesame and Spanish pepper. Watermelons constitute an important article of food in the summer months. In general the agricultural products are largely those of Germany; wheat, barley and beans are extensively grown, and in the northern part of the region potato fields surprise the traveler from foreign parts. Honey replaces sugar, and the leaves of the white-thorn, tea. It would appear that here, as in many parts of China, the habit of tea drinking originated in a dislike for cold water and the desire to render more palatable the taste of warm water, a condition that was easily realized in the decoction that was obtained from the leaf of the tea; only with the invasion by the Chinese of southern China in the period of the Second Punic War were the special qualities of tea discovered

The Coreans closely resemble the northern Chinese, but their bodily build is superior and the beard-growth is more luxuriant. Their language proper, the *Onmun*, is clearly non-Chinese, being distinctly polysyllabic, like the Japanese, with which it constitutes a part of the Mongolian stem. Its written form is expressed by distinct alphabetic symbols, and not by syllabic characters, as in the very difficult Chinese, but at the present time the use of the *Onmun* alphabet seems to be restricted almost entirely to the lower classes and to the women. In official and commercial circles the Chinese system is almost exclusively used, and necessarily, therefore, little else is taught in the schools. It can with truth be said that the people speak Corean, but write Chinese The Chinese language has, however, made large inroads into the Corean, usurping the place of the latter with the classes already referred to much as the French took the place of the German, in Germany, for a period of some two hundred years. The purity of the Corean language has long since disappeared.

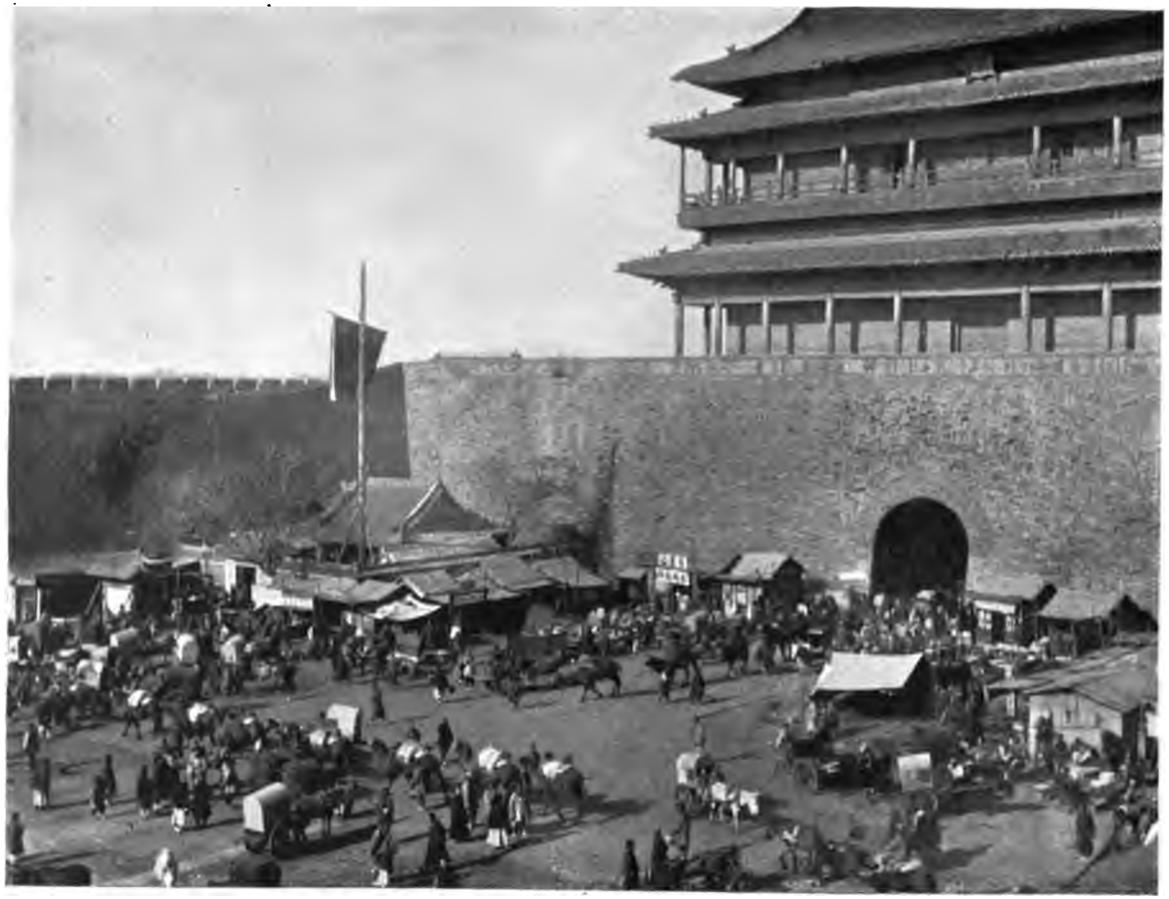
Very powerful has been the influence of the Chinese upon the habits and customs of the inhabitants. Personal uncleanliness and shyness of water are shared by all classes of the Coreans equally with the Chinese. Prof. Kirchhoff draws a most unfavorable picture of Corea's decadence in science, in government, and in the general arts of civilization—a decadence that can be traced back to the period of the Japanese invasion at the close of the sixteenth century. Yet it was through this land that Japan acquired from China the written characters of language, the silk industry, Buddhism, the compass, and many of the technical arts ; to Corean settlers in Japan is traceable the wonderful development of the eastern ceramic art. "Rarely do the creations of Corean art pass into the actual present ; great structures, such as the thirteen-story marble pagoda of Seoul, the remarkable monastery of Tondosa (with its singular architecture and colored frescoes), do exist, but they belong to a period preceding the Japanese invasion. Unaltered to the present day, however, and in sharp contrast to the practice of China, is the ancient division of the population into classes and castes—an aristocracy of State's officials and the military, the agriculturists, shepherds, fishermen, hunters, and mechanics or tradespeople. In other respects the Coreans are slavish followers of the Chinese. . . . The massive city walls, with their pagoda-crowned gates, are absolute copies from China, as are also the pillared-hall and audience chamber of the royal palace. Similarly Chinese is the composition of the State's service, the queued bureaucracy. With the exception of a few thousand men, who have been recently armed after the manner of Europeans, most of the military are still armed with lances and match-locks ; at times of special necessity the tiger-hunters are called in from the mountains to do service as militiamen. Science, in the land where the art of printing was practiced before it was in Europe, has been completely exterminated ; painting and sculpture are extinct ; the instructors of the Japanese in the ceramic art no longer burn porcelain ; the open window-frames are glazed with paper."

THE returning members of the Peary and Peary Auxiliary Expeditions were landed at Philadelphia by the whaler *Falcon* on the 25th of September.

ICE-CAVES AND ICE-GORGES.

AMONG the more interesting of the cave formations of the globe are the extensive hollows, occurring generally in limestone and basaltic deposits, in which, during the greater part of the year, large quantities of ice are retained. All the known ice-caves, which number 100 or more, belong to the temperate zone of both the Old and the New World, and are especially developed in mountainous regions, such as the Alps, the Carpathians, the Jura and the Urals. In such caves the ice formation is sometimes of vast extent, possibly measuring several metres in thickness over the floor; stalactitic and stalagmitic structures of ice are largely developed, and massive combined columns are formed in the manner of the similar columns of lime-carbonate in the ordinary caves. Fugger, in 1882, estimated the cubical contents of the ice-mass in the cave of Kolowrat, near Salzburg, in Austria, at 92,000 cubic metres; the dimensions of this cave are given at 108 metres length, 40 metres greatest width and 34 metres average height. Both in extent and beauty this cave is, however, excelled by the Dobschau cave of northern Hungary, situated near the foothills of the Carpathian Mountains.

Much uncertainty has until recently existed, and perhaps still exists, regarding the method of formation of the ice. By some it has been contended that this takes place in the summer season, and that in the winter there was a corresponding thaw. Jarz found the (gneiss) caves of Frain, in Moravia, completely dried out in the month of February, 1882, whereas in midsummer freezing was actually in progress. Much the same condition has recently (1892) been found by Terlanday in the ice-cave of Szilicze, in the county of Gömör, in Hungary. On the 4th of January the cave was found to be completely dry; the floor and roof were equally dusty, and scarcely any vestige of the ice of the previous year remained. The investigator was shown the position where in the July preceding the most massive column of ice stood. At the time of a second visit to the same cave in the early days of April the ice-formation had largely advanced and was in continuous progress, the dripping ceasing only when the temperature had sunk to —2°C. (28° 4 F.). A still later visit showed that the freezing, with the making of ice-stalactites, continued through the month of May, and perhaps to



GATE SCENE, CHIEN-MUN—PEKING.

an extent also in June; during the days of July 2–16, and October 2–5, subsequent periods of observation, the ice was undergoing continuous melting.

It is well known that the temperature of the interiors of ice caves varies within the limits of only a few degrees, rising somewhat above the freezing point in summer, and descending, in extreme cases, to a possible 22° or 20° F. in winter. The lowest temperature recorded by Terlanday in the cave of Szilicze was 21°.6 F. (the night of January 5th). The constant low temperature of winter-time led Fugger naturally to assume that the ice is an ordinary winter product, which the summer's sun is not able to melt; and the observations of this investigator among the ice-caves of Switzerland seem to support this conclusion. Schwalbe, on the other hand, basing his observations on the absence of ice from many of the caves in winter, assumed the deposit to be of summer origin, formed by the refrigeration of water of a low temperature in percolating through porous rock. The facts as they appear make it indeed difficult to harmonize the two theories or to satisfy the two conditions, but possibly the conclusion arrived at by Terlanday, from his investigations upon the Szilicze cave, may give a true insight into the anomaly that is presented. His conclusions are: The ice of the interiors of caves is of spring, and possibly early summer, formation, and results from the melting (and re-freezing) of the winter ice which has accumulated on the exterior of the cave-walls and in the different joints, rifts, and cracks which penetrate it, and through which the percolating waters are slowly but surely sent to the interior. That these rifts are well lined or filled with ice, Herr Terlanday has satisfied himself through a personal examination. In confirmation of his views he presents the interesting fact that the temperature of the dripping waters (within the cave) in winter-time was, near the roof, almost invariably several degrees above the freezing point; in April, on the other hand, the temperature stood just as steadily at about the point of freezing.

Of a somewhat different type of structure than the ice-caves, yet representing many of their features, are the ice-gorges or mountain rifts which even during the heated term of the year retain much of the winter's ice. Many of the so-called ice-caves belong to this series, but the fundamental element of difference between the two lies in the absence or presence of a protecting roof. In the ice-gorges the winter snows accumulate directly on the floor, and where this is sufficiently profound, and the rift too narrow to permit of much penetration of sunlight, they are retained—either as snows or as the congealed product of snow (ice)—by virtue of the low temperature which there prevails. In many of the mountains of the eastern United States—the White Mountains, Catskills, etc.—a summer-ice is found in a number of the deeper gorges, but very generally it is of insignificant extent, and often it disappears entirely. The Stony Clove and Tuckerman's Ravine have often been searched and barely more than a few feet of ice discovered in them. Very different is the case with the exceedingly narrow rifts of the Shawangunk Mountains, of the southern part of New York State. To their dark recesses the sun barely penetrates, and the temperature of winter lingers on well into the summer months. The writer had occasion during the present summer to visit the large rift which, at an elevation of some 1600 feet, lies about two miles almost due east of the town of Ellenville, in Ulster County. In this rift, which descends some 70 to 90 feet, and measures barely 15 or 20 feet in width, the July snow (or ice) stretched itself out as a miniature glacier, perhaps a hundred feet or more in length, and from two to three feet in thickness. Great icicle pendants hung in curtains over the ledges, from which, in places, cataract ice-masses descended to still greater depths. A thermometer placed about a foot above the floor of the gorge indicated a temperature of 34.°5 F.—at three feet above it, 36°. Barely a hundred feet above this point the mercury, exposed to the sun, ran the full length of the thermometric column, to 125° F.! In a two minutes' descent from the top to the bottom, therefore, an interval of ninety degrees of temperature is passed through—an experience that is to be obtained at but few points of the earth's surface and one that seemingly can be enjoyed with impunity by the majority of the human kind. Seven years before, in the same month, almost exactly the same conditions were presented, and it is maintained by the inhabitants of the region that the yearly variation is at best insignificant. It is to be regretted that up to this time no scientific examination has been made of this remarkable gorge. As little as it is known to science, so is it unknown to the public at large, and even in its own region it has all but escaped attention.

THE CONDITION OF THE EARTH'S INTERIOR.

THE EDITOR.

THE publication by Lord Kelvin (Sir William Thomson), president of the Royal Society of London, of a series of lectures and addresses on geology and general physics, calls up a number of interesting points in connection with the history of the earth's interior. To the student of science these papers are full of suggestion and fact, and if the greater number of them have already appeared in print, in one form or another, they come back, in the maturity of thought and expression, with a luminosity and intensity that fittingly place them beside the teachings of the greatest scientific masters of the century.

Just thirty-two years ago this distinguished physicist communicated to the Royal Society his conviction, based upon a study of the behavior of the earth's interior, and of the conditions of consolidation of the earth's materials, that our planet, contrary to accepted notion, must be, "on the whole, more rigid, certainly, than a continuous solid globe of glass of the same diameter, and probably than one of steel." At that time the theory of a thin shell or crust floating on a liquid interior, or supporting itself by equal pressure and strain in the manner of an arch, was almost universally taught, and there were few, even among the advanced physicists and geologists, who were prepared to depart from the orthodox notion which had so long been implanted in the human mind, and which so easily satisfied the demands which certain problems in geology made upon them. The manifestations of volcanic energy—the issuance of enormous masses of molten material from the earth's interior—and the great land-movements which were involved in the making of the continental areas and the oceanic basins, together with the minor movements of mountain formation and deformation, were seemingly explicable only on the assumption of a thin crust and deep molten interior. To-day this doctrine is scarcely longer taught; a few there are who yet linger with the old theory, and while, perhaps, it cannot be said that the doctrine of rigidity has been demonstrated to a definite conclusion, the later researches of Sir William Thomson himself (on the non-plastic behavior of the crust to solar and lunar attraction), of Prof. George Darwin, of Professor Newcomb (1892), and of M. Rudski (1894) make it so nearly certain that little room for doubt is left in the premises.

The doctrine of terrestrial solidity does not, however, involve the assumption of equal, but of average, rigidity, but, manifestly, there can be no great departure from a condition of general equality; nor is it implied that, because the earth is virtually solid to the core, local areas of liquidity or fluidity do not exist. Indeed, it is upon the existence of such "pockets" of moving material, or, perhaps, upon a continuous liquid zone, which, at no great distance from the surface, separates a "thin crust" from the solid interior, that the geologist in a measure relies to harmonize his facts with those of the mathematical physicist. Again, it should be carefully borne in mind that the quality of rigidity may be expressed in a body that is still potentially fluid, as, for example, when water, encased within definite boundaries, is subjected to its greatest limit of compressibility. In this condition it is absolutely rigid, although it still retains its general properties of a fluid. So the earth may be assumed to be as rigid as steel, or twice as rigid, as the calculations of M. Rudski seem to indicate, and yet this assumption need not destroy the fundamental conceptions of a rocky, and even largely compressible, interior, with which the mind has been so long familiarized.

The notion is still very generally held, and just as generally taught, that the increase of heat from the surface of the earth to or toward the center—a condition that is demonstrated in all borings—is a uniformly progressive one, and that, necessarily, if the increment of temperature is assumed to be about 1° F. for every fifty or sixty feet of descent, an almost inexpressibly high degree of heat must exist at only a few miles below the surface. But Lord Kelvin shows that this increase is asymptotic, or follows the line of convergent curves, and that beyond a certain depth—assumed to be about twenty miles—it rapidly diminishes in value. Up to a depth of some 100,000 feet it is calculated that the increase may be at a nearly uniform rate of 1° for every fifty-one feet, but at 400,000 feet it has already diminished to 1° for every 141 feet, and at 800,000 feet to 1° in every 2550 feet, or to one-fiftieth of its original value. On this calculation the highest temperature need not much exceed 6000–7000°—the melting temperature for pressure at the greatest depth.

Lord Kelvin deals summarily with the question of the influence of the internal heat of the globe upon climate, and sets aside such connection as being hopelessly impossible. He says: "The earth might be a globe of white-hot iron, covered with a crust of rock 2000 feet, or there might be an ice-cold temperature within fifty feet of the surface, yet the climate could not, on that account, be sensibly different from what it is, or the soil be sensibly more or less genial than it is for the roots of trees or smaller plants." In explanation of the cause of warmer climates in past geological periods he offers the "almost infinitely probable" hypothesis of *a warmer sun.* This is surely a ready and easy explanation, but all that can be said for it at the present time is that it admits of neither proof nor disproof. In this same connection, although applying the teachings of the interior of the earth to external phenomena, Lord Kelvin points out that the underground heat can in no way be considered as a factor in determining the possible thickness of any ice-cap, being at the present time incapable of melting even a millimetre thickness of ice per annum.

As to the length of time which has elapsed since our globe cooled down to a condition of habitability, Lord Kelvin, as is well known, assumes a maximum possibility of 100,000,000 years; and it is upon this estimate that the Marquis of Salisbury, the president for this year of the British Association for the Advancement of Science, in discussing the present status of the doctrine of organic evolution, proclaimed his revolt from the theory of natural selection, believing this comparatively *short* period to be insufficient to account for all the changes that have been brought about in the organic chain.

A HOME AMONG THE TREE-TOPS.

WE illustrate in this number one of the most striking forms of animal architecture, taken from the bush of Yucatan, that the world of nature presents. Nearly every one is familiar, through the description of travelers, with the habits and economy of the white ants (termite) of South Africa, their huge habitations and almost endless marching columns, but it is not generally known that a closely related insect form inhabits the tropics of America as well, and with largely identical habits.

The writer of this notice first came upon their singular habitations in the open scrub of northern Yucatan, where they were found perched among the axils of low trees, some eight to ten feet above the ground. Their gray color and "papery" appearance, so suggestive of the nests of the social Hymenoptera, threw out that caution which is ordinarily exercised in approaching the habitations of bees and wasps, but which in this instance was wholly unnecessary. The puncture of the walls disclosed a busy community of almost infinite life—restless and seemingly ever active. In the great mangrove forest which occupies much of the northern coast, and to which a primeval character has yet been retained, the termite nests find their greatest development, and by their singular presence construct a picture hardly to be matched elsewhere. Like great excrescences of the trees themselves, chocolate brown or almost black in color, they occupy positions forty, fifty or even sixty feet above the eye of the spectator. Individual trees may have as many as three or four of these giant nests resting in their axils, while others occupy low positions on the strangled trunks and cable-roots of the foresters, overlooking the oceanic waters which here and there find their way into the solitude. The greater number of the habitations were irregularly balloon-shaped, and some of them measured not less than four or five feet, or even more, in greatest diameter. On all the tree-trunks thus adorned long and more or less tortuous tunnels, constructed of the same salivary paper, and measuring perhaps two-thirds of an inch across, could be followed by the eye meandering upward to their terminations in the great nests, to which they form the avenue of approach. Wherever tapped they disclosed the same busy life—an army of traveling ants—as did the interior of the nest itself.

BATTLING WITH AN ARCTIC HURRICANE.*

JOSEPHINE DIEBITSCH-PEARY.

THE weather was not very encouraging as we started from Redcliffe House on Tuesday, August 9th, the strong wind of the two previous days having brought up heavy storm-clouds, which now hid the sun and hung threateningly overhead. It was just about noon when we left the beach at Redcliffe, the light *Mary Peary* shooting rapidly along with the strokes of the six Eskimo boatmen, and in a short time we had rounded Cape Cleveland and started eastward up the gulf. The scene before us was very different from what it had been ten months previously, when we made our first attempt. There were then numerous pans and streams of ice, with the new ice rapidly cementing them together; the land itself was covered with snow, and the ice-foot had already commenced to form on the beach. Now there was only an occasional fragment of ice, though the great bergs were numerous. The mountains of the shore were rich with the warm hues of summer. Late in the afternoon a favoring wind came up from the west, and with foresail hoisted we moved merrily along before it. Relieved thus from their labors, our crew lounged contentedly upon the seats, and fell into a conversational mood. Mr. Peary learned from them that many years ago Mekhtoshay had shot an "amarok," or wolf, at Netchiolumy, and that Panikpah had killed one at Nerki; Koomenahpik and Mekhtoshay, who are brothers, also related that years ago they had both seen "oomingmuk" (musk-oxen), "awahne, awahne, Etah" (far beyond Etah).

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* From Mrs. Peary's "My Arctic Journal"; reprinted by special permission.

At half-past six in the evening we reached Karnah, a small Eskimo settlement on the north shore of the sound, some twenty miles from Cape Cleveland. Here the low, flat shore ends, and a line of towering gray cliffs begins. We pitched our tent on a level bit of grass among the stones, and after our evening meal was completed we crossed the noisy glacial stream flowing near the village, climbed the hill just west of it, and then followed the shore westward till we came to the stone igloos of Karnah the deserted. Four houses form this village, which lies in the center of a beautiful grassy meadow, stretching back from the shore to the foot of the brown mountains. The luxuriance of the grass here was wonderful. All across the meadow we waded through it, literally knee-deep, and in one or two places immediately about the igloos it was so rank that as I stooped to gather some sprays for pressing I was almost hidden. Returning to our tent, we were soon lulled to sleep by the boisterous music of the glacial stream. During the night it snowed lightly, and when we awoke the ground was covered with a white mantle, which, however, soon disappeared.

Leaving Karnah on the morning of the 10th, for three or four hours we threaded our way through bergs and great cakes of blue ice, past the giant cliffs of Karnah, with their great bastions, towers, chimneys, and statues, carved by the Arctic storms from the gray sandstone, the breeding-places of black guillemots, burgomaster gulls, and white falcons. As we passed along our Eskimo boatmen pointed out to us the striking figures, all of heroic size, looming against the sky far up the cliffs, and told us that such and such a one was a woman, and such another a man, and that the cliffs themselves were known as "innuchen" (statue rocks). There would be wide scope here for the imaginative genius who has given the nomenclature to the rocks in the Garden of the Gods. All this time it was raining in fierce showers, and we rounded the point of the bay east of Karnah in the face of one of them. A number of deer were seen quietly grazing in the valleys. A fresh wind came up from the south, and we went dashing up the bay, with the foam flying from the bow of the boat, and a boiling white wake behind us. We landed on a sandy beach near the head of the bay. While the tent was being pitched and the boat hauled out of the water a school of white whales ("kahkoktah") came puffing and sporting into the cove, and Koomenahpik immediately went out in his kayak, which we had in tow, after them. He remained out for an hour, but as the result of cautiousness, either on his part or on the part of the whales, he did not succeed in getting near enough to use his harpoon, and returned unsuccessful. The view from our camp was very impressive. Facing us, and forming nearly a semicircle, was a great glacier; just across the cove a great nunatak reared its brown mass above the ice, and everywhere the cliffs were of a warm red and brown coloring, a marked contrast to the wintry shores of Herbert and Northumberland Islands, and to the chilly, gray sandstone cliffs of Karnah. Our tent was pitched just above high-water mark beside a little stream whose banks were actually yellow with Arctic poppies.

The heavy showers continued through the night, and we waited until noon of the 11th for them to cease. While Mr. Peary climbed to the top of a rock to obtain some bearings, I took my rifle and started up the valley in search of deer. In a short time I had shot two. One of them I brought down at long range while he was running at full speed. As this day was the anniversary of our wedding, we celebrated it mildly with a milk punch and fried liver from the deer which I had shot. Here, midway between the Arctic Circle and the Pole, we were in a verita-

A HOME AMONG THE TREE-TOPS.

le garden spot Vines and plants and owers run and grow in luxuriant abunance over and in the crevices of the rocks. he stream which empties into the cove omes from a beautiful mirror-like lake set n a grassy meadow only a short distance p the valley, and over the protecting ledge o the west come the continuous thunder nd groanings of the great glacier.

Continuing our exploration, we arrived, hrough wind, snow and rain, at the preciptous island which lies near the eastern exremity of the gulf. Here, in the angle of he island and a huge glacier, in which it was partially buried, we pitched the tent, though not without protest from the natives, who said that the waves from an iceberg breaking off the glacier might smash the boat and swamp the camp. While we were at dinner Koomenahpik raised the alarm of "kahlillowah," and looking out we saw two narwhal among the bergs, a large one and a small one. We immediately pulled out for the animals. As we approached, the larger of the two disappeared, but we were able to get near enough to the other one for me to put a bullet through its head; then Koomenahpik drove a harpoon into its back, and after a short struggle we had it in tow for the camp. The next morning we found my prize high and dry on the rocks, a great mottled, misshapen mass of flesh, with a gleaming ivory horn, straight as an arrow, and almost as sharp as a stiletto, projecting straight out from its nose. It was a wonderful sight to me, who never before had seen the narwhal, the fabled ancestor of the unicorn. I could not gaze at it sufficiently.

When we started off again, in the afternoon of August 14th, our boat,was loaded down almost to the gunwales with our trophies of narwhal and reindeer, the tents, and other equipment. The morning's promise of pleasant weather had not been fulfilled. Heavy black clouds were gathering thick and fast, and by the time we had reached the southern end of the island it was raining steadily. As we ran out from the lee of the island the full force of the now furious northeast gale struck us, and we were pelted mercilessly with sheets of water. It was a wild scene, with the sullen, spectral glare of the great glaciers north and east of us beneath the pall of black clouds, the wind howling over us as if it would pick us bodily out of the water, and the black cliffs at the mouth of Academy Bay, our destination, mere shadows, felt rather than seen through the rain full twenty miles to the south. The gulf was full of great bergs and masses of hard blue ice, the outflow from the glaciers, through the mazes of which we were obliged to pick our way; yet they were our friends, for they kept the water smooth in spite of the raging wind, and gave us now and then a shelter, behind which we could stop for a few moments and catch our breath before striking out again into the furious blast. Fortunately, the wind was partly in our favor; in spite of our tortuous course we made rapid progress, and in four hours were abreast of the group of islands down in the southeast corner of the gulf, which we had visited in April during our sledge trip. From here to Tawanah's igloo at the mouth of the bay was the critical part of the voyage. This distance was entirely free of ice, and though only five or six miles in width, the force of the wind was such that the whitecaps were rushing madly across it as we came out from under the shelter of the islands. With just a bit of the foresail up to enable the boat to run away from the waves, and two oars ready to be dropped instantly into the rowlocks, in case of necessity, we dashed madly along, with every now and then the top of a wave coming in over the stern of the boat, and striking Mr. Peary and myself in the back with a resounding whack. More than once my teeth involuntarily closed more firmly as I saw a mad white crest rushing down upon us, but our little craft rode the waves like a duck, and we finally shot under the lee of the point at Tawanah's igloo. As the boat sped along through the placid water and the sail flapped against the mast in the eddy of wind under the point, every one breathed a sigh of relief.

In spite of the fury of the storm out in the gulf, here in the bay under the steep shore everything was calm and quiet. The mast and sail were taken down and the oars run out, and our native crew settled down to work again, glad to warm themselves by exercise. Suddenly, however, the wind, with the perverseness common to winds in these Arctic regions, came rushing out of the bay, meeting us full in the face and making it almost impossible for the men to make head against it But Mr. Peary spurred them on, and by hugging the shore we succeeded, with the aid of the tide, in reaching a little island about half-way up the bay, opposite which, despite the high waves, we effected a landing. We had the utmost difficulty in setting up our tent, but we at last got the better of the hurricane by securing the bottom of the tent all around with huge stones.

Never before had I understood the power of the wind. To add to its terrifying effect, it did not blow steadily now, as when it first commenced, but came in frightful gusts with intervals of calm between. For perhaps a minute or two it would be absolutely still, the black cliffs across the bay would loom up in perfect distinctness, and every intonation of the waves, dashing upon the rocks, could be heard ; then a rushing white wall would spring into view around the bend of the bay a mile or so above us, an ominous murmur would be heard, rapidly increasing in volume and intensity, until, with a roar, the Arctic blast was upon us, literally cutting the tops off the waves and hurling them in solid masses of water far up the cliffs. The icebergs went tearing out of the bay like ships in a ten-knot breeze. A number of these bergs sailed in toward our little island, and, grounding at the upper end of the channel, formed a complete breakwater. When the wild gusts struck these great bergs they rocked and groaned, flung themselves at each other with thunderous crash, reeling backward shattered and split from the shock, while all the time the waves dashed against their outer faces, climbed in white jets clear to their tops, and fell in intermittent cataracts into the waters of our little harbor. It seemed as if we were at the very gates of the Hyperborean Inferno. All night long this struggle continued, the flying spray from the iceberg breakwater dashing against the tent, drenching it and all its contents. Mr. Peary and Matt spent the greater part of the night in holding up the tent-poles.

By morning the storm had exhausted its fury, and we were on our journey once more. But heavy weather soon set in again, and a disagreeable drizzle continued throughout the night and the greater part of the following day. We made a bee-line diagonally across the gulf to Karnah, the castellated cliffs of which could just be discerned through the gray mist which hung low over the water. Head winds and a contrary flood-tide made our progress slow, and it was only after a long and weary day of hard work for the men at the oars, and of wet and cold and cramp for those in the stern of the boat, that we touched the northern shore a few miles above Karnah, where we gladly availed ourselves of the opportunity to jump out and stretch our stiffened limbs. It was our intention to camp here for the night, but after the refreshing effects of a hot dinner, with ample draughts of tea, every one felt so much better, although thoroughly tired out, that we determined to push on to Redcliffe. As we neared Cape Cleveland the wind blew a gale, but now, for the first time, it was in our favor, and Mr. Peary ordered up both sails. Under Matt's skillful guidance we went flying past the cliffs for the mouth of McCormick Bay, dodging the hard blue lumps of ice, some of which could not be seen until we were almost upon them, frightening a herd of walrus into which we dashed unexpectedly, and then at last whirled round the point at Cape Cleveland into an eddy of quiet wind and water. Scarcely had we rounded the cape, however, when Mr. Peary's eye saw another one of those white squalls rushing down upon us from Tooktoo Valley, and there was just time to get the masts and sails down, and the men to the oars with feet braced against the seats and backs straining to the bending ash-blades, when the squall was upon us. The wind tore off the tops of the waves and dashed them in our faces until it was impossible to see. When the gusts were at their height the men could only hold their own and prevent the boat from being blown backward out into the sound, while in the intervals between they managed to gain a little, and in this way we crept along inch by inch toward the sheltered beach on which we had landed from the *Kite* a week before. Suddenly, just as we came abreast of the place where a still remaining portion of the ice-foot formed an ugly overhanging shelf, under which the waves broke furiously, Kulutingwah's oar snapped short off, and Kulutingwah himself, with a wild cry, pitched backward into the bottom of the boat. In the momentary confusion which followed, the boat began drifting rapidly under the shelf, when Mr. Peary seized the oar of the man nearest him and urged every one to his utmost, at the same time shouting to Kulutingwah to jump for the bow of the boat and throw the grapnel out. With understanding quickened by fear, the Eskimo carried out the order almost as soon as it was uttered, and with all still tugging at the oars to ease the strain upon the anchor-rope, the boat settled slowly back inch by inch, until finally she stopped so near the wicked blue shelf of ice that I could touch it with my hand. This respite gave us a chance to recover our breath, and enabled Mr. Peary to make a change in the disposition of the men. In the intervals between the gusts the oars slowly and painfully worked the boat ahead, and before the next squall struck us the grapnel was thrown over, and every one crouched low in the boat to present as little surface as possible to the wind. In this way, with the woman Armah crying and screaming in the bottom of the boat, and the faces of the men a dingy white, we at last reached the coveted beach. So deafening was the roar of the wind that we could hardly hear each other's voices.

THE WORLD'S HIGHEST MOUNTAINS.—CHIMBORAZO.

PROBABLY the best known by name of all the snow-capped summits of the globe, with the exception of the Mont Blanc, is Chimborazo, the proud monarch of the Equatorial Andes of America. Although by far not the loftiest elevation of the earth's surface, and lacking seemingly nearly four thousand feet of the altitude of the highest peak (Nevado de Sorata or Illampu) of its own mountain system, this mountain early acquired fame through the writings of Alexander von Humboldt, whose attempted ascent to the summit of the peak, in 1802, will for all time be memorable. Humboldt, by his own determinations, reached an elevation of 19,286 feet, falling short of the summit, according to his measurement, by somewhat more than 2150 feet. This was the highest mountain ascent that had been made up to that time, and it remained such until 1831, when another attempt on the same mountain was made by Boussingault and Hall, with the result of reaching an altitude of 19,698 feet. Humboldt, who, at the time of his explorations, was thirty-three years of age, considered Chimborazo the grandest of all mountains, and for many years (until about 1820) it was assumed to be the loftiest summit of the globe.

Darwin, who, in the early "thirties," visited the Chilian Andes, and was but slightly affected with mountain trouble in the Portillo Pass, at an altitude of 13–14,000 feet, wrote in his narrative: "It is incomprehensible to me how Humboldt and others were able to ascend to the elevation of 19,000 feet." While far greater heights than those claimed to have been reached by Humboldt and Boussingault have since been repeatedly attained by travelers, it is by no means improbable that the figures of these distinguished savants have been overstated. Whymper, who in recent years made two successful ascents of the mountain, and according to whose barometric observations the total elevation is only 20,489 feet (or nearly a thousand feet less than was assumed by Humboldt), believes that his intrepid predecessors did not pass beyond 18,528 feet—a position on the mountain well defined by a buttressed wall of rock.

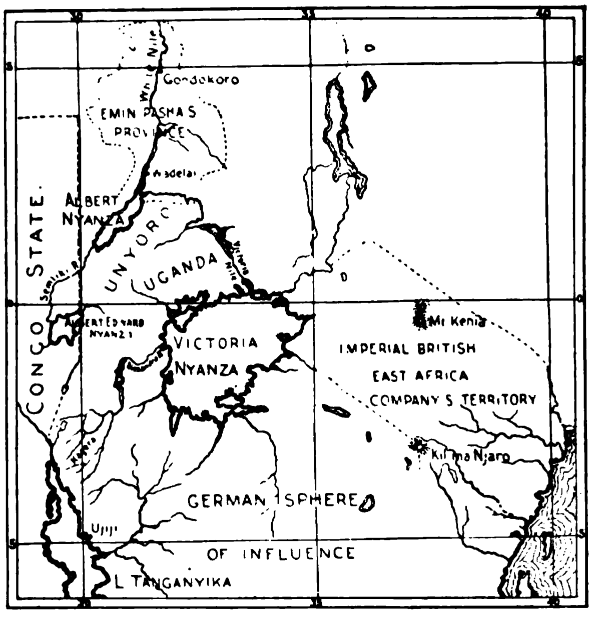
Chimborazo is an ancient volcano which has undergone effacement of outline, and whose slopes are still badly scored by lava-fields. Humboldt, in the exceedingly attractive frontispiece to his "Views of Nature," represents it as a strikingly symmetrical cone, equaling in curve and symmetry famous Fujiyama of Japan. Its true outline, however, as may be seen from our illustration, is that of an elongated ridge, bearing a double summit, on whose crest a long line of glacier slumbers. Its contours are almost precisely those of Ixtaccihuatl, the White Woman of the Mexican plateau, and like that mountain it bears evidence of having attained to considerably greater elevation than it now has. Also like the Mexican volcano, it has lost all direct traces of its crater, and no record exists of an eruption. Several glaciers descend over its upper slopes, but at times neither snow nor ice is to be met with below 17,000 feet. The limit of vegetation, indeed, ascends on the south side to at least 18,400 feet, where a species of lichen (*Lecanora subfusca*) was found by Mr. Whymper.

Few of the loftier summits of the globe offer more attractive points to the mountaineer than Chimborazo, or are easier to climb. With a good heart and a healthy pair of lungs the ascent is made readily possible. Although heavily ice-capped, and rising some 5000 feet above the monarch of the Alps, it can be ascended in certain seasons to very nearly 19,000 feet without the cutting of an ice-step; and on the summit, as Whymper found on January 4, 1880 (21° F.), the thermometer registers only a moderate winter. The western slope commands the Pacific Ocean, two hundred miles or more distant.

THE NILE FOUNTAIN.

APROPOS of the publication by Dr. Oscar Baumann of his explorations in the region of the Upper Nile affluents, a notice of which appeared in the December number of this magazine, a geographical correspondent writes to the Philadelphia *Ledger* from Berlin, under date of May 30th, as follows:

Dr. Oscar Baumann, who, though only 30 years of age, has already won a brilliant reputation as an explorer, first in the "Black Mountains" of Montenegro, and subsequently in the wilds of eastern Africa, has recently published a highly interesting volume entitled "Through Massailand to the Source of the Nile." It is profusely illustrated with heliogravures and autotypes from the photographs and sketches of the author. His journey was undertaken under the auspices of the German Anti-Slavery Commission, and seems to have led to the definite solution of a problem which has for ages occupied the attention of the scientific world.



THE NILE LAKE REGION.

When the celebrated English traveler, Speke, had discovered Lake Victoria-Nyanza, in 1858, and had followed its outflow as far as Khartoum, in Upper Nubia, thus identifying the stream beyond all possibility of error, he telegraphed, "The Nile question is settled!" This was true in the sense in which we may speak of the Lake of Geneva, as the source of the Rhone, or Lake Pepin, as that of the Mississippi; but it still remained to be determined where Lake Victoria-Nyanza drew its abundant supplies of water, and it was to the solution of this problem that Dr. Baumann addressed himself.

The most important affluent of the lake is the River Kagera, which delivers a volume of water equal to nearly two-thirds of that of the Upper Nile itself, and is recognized by the natives as "the mother of the River Yinya," which is their name for the Nile. All the other tributaries are insignificant in comparison with this. It was to the Kagera, therefore, that Baumann's attention was directed. Stanley called it the "Alexandra Nile," and endeavored to explore it in 1874, but hostile demonstrations by the natives of Urundi compelled him to abandon the enterprise. No further attempt was made until 1892, and the famous geographer, Elisée Reclus, who has recently acquired almost equal notoriety as a Socialist, was fully justified in saying in the tenth volume of his Nouvelle Géographie Universelle, "On cherche encore cette tête du Nil; comme au temps de Lucain, personne n'a eu la gloire de voir le Nil naissant."

This statement, however, was soon to be falsified by the facts. "On the 19th of Sep-

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tember, 1892," writes Baumann, "I proceeded up stream along the course of the Ruvuvu Nile, which is here a brook scarcely more than a yard wide, flowing through a narrow and marshy valley, between tall reeds and grasses. After a few hours I reached a point where the valley forks, and two little brooklets, scarce half a yard broad, unite. My native guides were in doubt which of these was to be called the Ruvuvu, or real Nile; but this seemed to me a matter of secondary importance, since both ravines ended, as could be clearly seen, in the scantily wooded hills which rose to the westward, less than a mile away. In their upper course they were mere gulches, to carry off the surface water. We stood at the starting point of the Kagera, the mighty affluent of the Victoria Nyanza—the fountain stream of the great Egyptian river; we stood, in fact, at the source of the Nile. The primeval problem, upon which it is Speke's lasting title to distinction to have cast the first light, was finally solved; the aim which, in 1874, Stanley vainly strove to reach was attained."

We may pardon the enthusiasm of an explorer who, at least, honestly believes, and apparently with good reason, that he has solved the great geographical puzzle of the last eighteen centuries. He admits that there are tributaries of the Kagera or Alexandra Nile, which take their rise further to the southward, but contends, quite justly, that this is a matter of minor consequence. The real question is, Where does the Kagera rise? and this he considers settled. In its course to the Victoria Nyanza it receives many tributaries, and flows through no less than seventeen lakes, but it remains always the principal stream, and when it finally debouches into the Victoria Nyanza, it is, even in the dry season, a hundred yards broad, with an average depth of twenty-five feet. In the rainy season this depth is increased to fifty or sixty feet. It pours into the lake more water than all the other affluents combined. "If," argues Dr. Baumann, "the lake merely collected the waters of a number of small and nearly equal streams, it might be itself regarded as the fountain of the Nile; but this is not the case. In comparison with the Kagera, all the other affluents of the lake are completely insignificant." There are tributaries of the Kagera which rise further to the south, the most southerly being the Luvirosa, whose source is in about 3° 45′ south latitude. But this, also, Dr. Baumann followed until he could see the cleft from which it issued, as pointed out to him by his guides. In whatever respect, therefore, the Nile problem may be viewed, it must be regarded as solved. The *caput Nili quærere* is a question of the past.

THE AMERICAN SEA-SHORE.

TO the one who knows the sea-shore from the cliffs and crags of Cornwall and Devon, or the opposite battled coast of France, or again from the less tempestuous but yet more beautiful strands of the Mediterranean and Adriatic, over which hang mountain visions of loveliest form and color, there is little attractive in the long line of sun-beaten sands which extends almost continuously from Long Island to the extremity of the Floridian peninsula, and beyond For a distance of fifteen degrees, or a thousand miles, in a north and south direction, and an almost equal distance westward, this shore-line, save where the New Jersey Highlands define its northern boundary, is unbroken by a single mountain eminence or headland, and over its entire extent no elevation greater than that of the highest construction by man is visible. It is, perhaps, doubtful if a similar shore-line, of anything like equal extent, is to be found in any other portion of the earth's surface. This is the great American bathing "belt," for while it is true that north of it many, and in several ways the most attractive, resorts are to be found, the force of population speaks distinctively for the south. It is perhaps not too much to say that at certain times one-hundredth of the entire population of the United States is concentrated on the Atlantic sands, and of this number, or 600,000, probably four-fifths are sand-waifs of the New Jersey and South Long Island (Coney Island) shores. Atlantic City, whose normal inhabitants count up only a paltry few thousand, has for single days risen to the rank of cities of the second magnitude, its quarter of a million of inhabitants or more making it a close competitor, in point of population, with cities like Cincinnati, Baltimore, Dresden, or Florence. The official records of the Pennsylvania and Reading Railroads show that on single days as many as 60,000 persons have been transported to the Atlantic City sands, and where these have been in considerable proportion increased by, or added to, the "floating public" of the day following or the day preceding, the sum only then makes clear how popular a resort may become. In the week ending

August 19th, of the present year, the three railroads arriving at this point report carrying down 125,000 passengers. Such a bodily transference of population to the seashore is unknown in any other part of the civilized globe, and the only approach to it is the condition that is presented by the not-distant Coney Island.

It cannot be said that the waves are the sole impelling force which attracts to this outer world. That the ocean is "popular" is proved by the multitudes which daily blacken its waters, but neither at Atlantic City nor on the beaches of Coney Island are the conditions for bathing more favorable than they are along miles of coast which are virtually deserted. Long Branch and Cape May, fashionable and attractive as they have been in their day, and while, perhaps, still retaining the full measure of their former dignity, have long since succumbed to a popular supremacy of their more modern rivals. It is in their precincts that the multitude gathers because it wants to be seen gathering; it is not alone the vision or sensation of the inrolling surf, of the sweeping swell that glides endlessly off into distance, or of the heated open sands which rise up to low sand-dunes and no more, but the recognition that these localities have become pleasure grounds or caravansaries for two of the great metropolitan cities of the country. One of the most interesting phases connected with the movement of our summer population to-day is the *solid* occupancy of the sea-shore. There is scarcely a stretch of a few miles along the entire ocean front of New Jersey which has not implanted in it one or more seaside resorts, and the day is visibly not far distant when the entire coastline of that State, with its closely connecting railroads, will be one continuous summer-inhabited community.

BEACH AT SCHEVENINGEN, HOLLAND.

In marked contrast to the configuration of this lower Atlantic sea-shore is that of the New England States, and of the region beyond, where the inrolling waves impinge upon weather-beaten cliffs, where tottering walls of rock replace in greater part the shelving reach of sand and mud. The eye in search of the wild and beautiful here finds its haven, and licks up mountain-forms and promontories scarcely less noble or picturesque than those of the opposite side of the ocean. The enchanting slopes of Mount Desert, or the red cliffs of Newfoundland, would hold their own anywhere, and seek no challenge to give them fame. At an earlier period of time, they, too, possibly, were encased by a sand-bound coast, but a prolonged and deep submergence of the land, to which the facts of geology bear witness, has seemingly carried away with it the garniture of monotony which yet afflicts the further south.

Our illustration of Cape May presents one of the familiar *plein-air* scenes of the Atlantic sands ; very different from it is the picture at Scheveningen, on the Holland sands, where the seclusion and comfort that are measured out by bathing wagons and wind-chairs are an integral part of the landscape.

THE DESTRUCTION OF THE PALISADES.

IT is not often that the law of the land has to be invoked to prevent the destruction of a mountain. Legislation has on several occasions been appealed to to prevent defacement of mountain scenery through the enterprise of the advertiser, and with more or less successful effect it has helped to retain for the landscape its proper share of natural purity, even if it has not prevented inroads into the pyramids of Egypt, the high summits of the Rocky Mountains or the rolling crests of the Atlantic Ocean. A few years ago the traveler on the Hudson River beheld with consternation the beetling cliffs of the Palisades receiving the brush of the advertising " artist," and for a time it seemed as though the first reading lesson for thousands of children would be read from the face of one of the grandest of nature's monuments in the eastern United States. Fortunately, however, a wise enactment saved to the American Rhine its precious ornament and rebuked that spirit of enterprise which sees at its furthest end only the acquirement of riches at any cost.

To-day the same mountain mass sees impending over it a fate far more humiliating than that of having its walls plastered over with business characters ; it is in danger of complete or very nearly complete effacement. For years past the Palisades have furnished some of the best of paving stones, and to several of the large cities of the country, and notably to the city of New York, it has contributed an almost endless number of their so-called " Belgian blocks." At many points along the back face of the mountains the quarries of greenstone or diorite opened their eyes to the sun, and the busy click of the drill and hammer could be heard from early morn until sunset. Slowly but steadily the mountain yielded its way as deep gashes were cut into its heart, but so long as the eastern or Hudson wall was left intact little attention was paid to the depredation that was going on behind. It seems, however, that the day has arrived when even the front wall is threatened, and, indeed, the calculation drawn from the franchises that have been obtained and the amount of stone that is to be furnished shows clearly that, unless there is an arrest of proceedings, the margin of existence can only be a narrow one. The wonder, in fact, is that the work of destruction, or at least of disfigurement, has not been a more rapid one, seeing how readily the stone might have been worked on, and transported from, the side exposed to the river.

It is gratifying to learn that an effort is being made, through legislative enactment or through purchase of the tract of land, and its conversion into a "National" or "State Park," to prevent this vandalic—yet, judged from the business standpoint, strictly allowable—destruction. New York has an interest in this river front as well as New Jersey, the scenery belongs and appeals to the inhabitants of both States alike, and, therefore, a united attempt to obtain release should go out simultaneously from both sides of the river.

In the event of the failure of such an effort, an appeal should be made directly to the National Government, for the interest in the preservation of the Palisades lies beyond New York and New Jersey—it is with the country at large.

NOTES ON MOUNTAINS AND MOUNTAINEERING.

ASCENT OF TENERIFE. — Dr. Hans Meyer, author of "Across East-African Glaciers," and the first, with his associate Purtscheller, to mount to the summit of Kilima'njaro, has recently published an account of an early ascent of Tenerife. Much snow was encountered in the exploration, and for a time its success appeared problematical. The latter days of March were passed at the Alto de Chaharra (9900 feet), and the ascent of the peak proper begun on April 5th. Although the snow descended to the 6000 foot level, it was found possible to make use of mules for a further 2000 feet. The "high view house," or hut of Alta Vista, which lies at an elevation of 10,700 feet, or but 1500 feet below the summit, was found to be completely buried in snow; the temperature of night there fell to 21° F. The actual summit was reached early next morning, when the thermometer registered 27.5° F. As in the case of many volcanic peaks which rise well into the snow-line, and whose internal heat penetrates through the wall of the mountain, the crest was practically devoid of snow.

A SURVEY OF KILIMA'NJARO.—A scientific study of this mountain, in its different relations of topography, meteorology, geology, botany, and agriculture, has, for some eighteen months or more, been conducted under the direction of two German specialists, Drs. Lent and Volkens, who have established themselves at stations ranging in elevation between 5000 and 9000 feet. Little hope is held out for a full success in agriculture, and even in the zone between 4200 and 5600 feet, which, seemingly, covers almost the entire tract that is inhabited, European enterprise does not, as yet, appear to have developed a single paying vegetable product. Various conditions, largely meteorological, interfere with the proper cultivation of tropical or subtropical plants, but it is thought that, with a proper choice of season for planting, and suitable irrigation, enough might be raised to measurably meet the requirements of colonists. Upward of two thousand species of plants have been collected for the herbarium.

THE POSITION OF MOUNT ST. ELIAS.—If the work of the joint British and American Survey in Alaska is to be depended upon—and there is reason to believe, from the manner of its execution, that it is more reliable than that of any previous survey—the United States loses what has been assumed to be its highest and noblest mountain. St. Elias, with its glittering snows and vast glaciers, is in British territory, being situated east of the 141st meridian, the line which defines the American purchase from Russia. This, in fact, has been for some time suspected by British geographers, but the recent surveys, executed on behalf of our national geological bureau, by Messrs. Russell and Ker, seemed to have disproved the claim, and to have definitely given over the mountain to the United States. A nation's pride may never cease to mourn the loss of this colossus, but all true lovers of nature will continue to love the mountain for what it is, irrespective of ownership, and despite the fact that it appears to be dethroned by two or three other peaks of the same region. The latest determination of altitude of St. Elias gives it 18,023 feet, whereas Mount Logan, only a few miles distant, is said to be full 1500 feet higher (19,534 feet).

REVIEWS.

A GEOGRAPHICAL DICTIONARY OF MASSACHUSETTS, CONNECTICUT, AND RHODE ISLAND. By Henry Gannett. Published by the U. S. Geological Survey, 1894.

These three little booklets, prepared by the Chief Topographer of the National Geological Survey, are a welcome addition to the geographical literature of this country. They are designed, as is stated in the preface, "to aid in finding any geographic feature upon the atlas sheets" of the different States of the Union that have been published by the Geological Survey; consequently they contain only such names as are to be found on these sheets, and no other. Some idea of the fullness of these sheets may be inferred from the fact that the enumeration of localities in Massachusetts alone takes in nearly 116 pages, with generally more than forty names to the page. We find forty-two simple "Longs," such as "Long Beach—on southeastern coast of Rockport;" "Long Hill—in Leominster, elevation, 880 feet," etc. Long Island Headlight is amply described as "lighthouse at northern extremity of Long Island, Boston Bay; height, 121 feet; fixed light, and is visible sixteen miles." These few extracts are sufficient to indicate the scope of the publications, which, in many ways, take the form of a condensed gazetteer. Indeed, when carried out to cover all the States of the Union, they will, in one way, constitute the most extensive gazetteer that has ever been published of any country; ponds, huts, brooks and junctions—in fact, anything that is entitled to representation on large-scale maps—find their place in the enumeration. It is only to be regretted that the cities are not more fully treated, at least to the extent of having their populations given. Had this been done, the publication would be a most invaluable one, and it is not easy to see why they are not

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as much entitled to this additional description as are the mountains to the statement of their elevation. Boston is disposed of as a "City in Suffolk County; area, 42 square miles," whereas the Boston and Maine Railroad is accorded space for the definition that it is a "railroad running northward and westward from Boston, and, with its many branches, covering nearly all of northeastern Massachusetts." Economy of space, probably, dictated the deficiency, which, it is hoped, will be removed in subsequent editions. It is almost needless to emphasize the general usefulness of such a publication, the preparation of which could have found no more competent hands than those of Mr. Gannett.

ON THE WALLABY: OR THROUGH THE EAST AND ACROSS AUSTRALIA. By Guy Boothby. London and New York: Longmans, Green & Co., 1894.

The title of this book hardly conveys a true conception of its scope, for more than one-third of its 340 pages is taken up with a narrative of wanderings around and about Ceylôn, Singapore, Batavia and New Guinea. The remainder of the pages are given over to the main narrative, a "skirmish" across the plains of Australia. Mr. Boothby is nothing if not a racy writer, and if his method in writing can be taken as a measure of the man in the field, it will unhesitatingly be admitted that he is the veritable *compagnon de voyage*. He is not a scientist, nor even a deep or philosophic observer, but he sees much, and has the faculty of most graphically describing what he sees, feels, or thinks. He has made no great discoveries, and claims to have made none, but withal he has much information to give on regions which have and which have not before been traveled over. The following extract from Chapter VII will serve as a good illustration of the manner of the work: "On our return to Port Kennedy we were again thrown upon our own resources. We could get no work, to beg we were ashamed, and owing to our limited education we had not even sufficient ability to thieve with any likelihood of success. It began to grow upon us that the pleasant expectations we had formed regarding Thursday Island and the pearl fishery were not going to be realized. We waited and waited, like Mr. Micawber, 'for something to turn up,' but beyond an occasional day's work among the shipping we were without employment of any kind whatsoever. We began even to envy the lot of the prisoners in the gaol. They were at least certain of a meal. If ever I want to have a good old lazy time, untrammeled by the thoughts, cares, and anxieties inseparable from that mysterious occupation known as getting one's living, I shall commit an offense, and get consigned for three months to Thursday Island gaol. It was my good fortune, one morning, to see two prisoners engaged whitewashing the post-office fence, and I am prepared to assert that never since have I seen anything so lazy and comfortable, as their method of carrying out that particular occupation. To show their position in the social scale they had 'Thursday Island' printed in large letters across their backs, and from the placid and contented fashion of their labor, I gathered something of what a similar sentence to theirs must mean."

It must not be assumed from this extract that the work has not its serious side. There is enough in it to make it very profitable reading, and the style of the narrative, which is largely in conversation, and breathes the atmosphere of intense realism, is such as to hold the reader from first page to last. The illustrations (by Ben Boothby), which are not up to the standard of the works of American illustrators generally, are numerous and attractive. It is to be regretted that this one, like so many other books of travel, is wanting in a map.

NOTES.

THE POPULATION OF BELGIUM.—The industrial development of Belgium during the latter half of the present century has been productive of a large increase to the population of that country. At the close of 1831 the official census reports gave count of 3,785,814 inhabitants, whereas the latest returns, for the close of 1891, show this number to have increased to 6,136.444, a gain of 63½ per cent. in a period of sixty years. Immigration and emigration about equalize one another at the present time; in 1892, 21,774 persons entered Belgium, and 22,532 left it.

NEWLY-DISCOVERED LAND IN THE ARCTIC SEA.—The Swedish Captain Hans Johannessen, who under great privations wintered in the New Siberian Islands, reports the discovery by him, about fifteen miles northwest of the Siberian archipelago, of a new land-mass, to which the name "Hansenland" has been given. It is described as a barren region devoid of vegetation, with high mountains and deep valleys, through which huge glaciers descend to the sea. It is a little remarkable, if such a land exists, that it should not have been discovered before, lying as it does so near to points that had so frequently been visited before. Especially surprising is it that Baron Toll, in his recent explorations, makes no mention of it.

THE CONDITION OF ST. HELENA.—It would appear that this diminutive, historic possession of Great Britain, which in 1891 numbered less than 4000 inhabitants, is rapidly losing what prosperity it ever had. The withdrawal of the garrison, and the deflection of the eastern trade into the Suez channel, are held to be responsible for this. So critical has become the condition of affairs there that Mr. Grey-Wilson, the present governor of the island, has been obliged to visit London to ask for assistance from the British government. Jamestown, the capital and port of entry, has lost all its old-time life and commercial activity. The youth have wandered in search of wealth to the South African gold and diamond fields, and it is claimed that mainly old people and young women remain.

THE DEPTH AND TEMPERATURE OF THE RED SEA.—Recent investigations into the physics of the Red Sea reveal a greatest depth to that body of water of 1620 metres (or 5200 feet), in Lat. 23° 11′ N.; a depth of 1232 metres was also found in Lat. 21° 14′. At a depth of 150 metres the temperature was found to be lower than at the surface, but beyond this point for some distance the temperature steadily rose, and at 250 metres it was again warmer than at the surface.

SNOW AND ICE IN SOUTH CHINA.—Professor Ratzel communicates to Petermann's *Mitteilungen* an interesting account of the very remarkable frost which visited southern China in January, 1893, and penetrated even beyond the Tropic—seemingly the severest weather that is recorded for that region. Beginning in the north of China on January 8th, the storm swept relentlessly through the empire, causing widespread destruction and misery along its course, and in a few days reached the more southern provinces. Snow fell at Amoy on the 15th and 16th, and at Swatow and Hong-Kong the cold rain, with a temperature reduced to the freezing point, was soon converted into ice. At Foochow the snow attained a depth of from six to nine inches. Only once since the closing of its port to foreign commerce has snow been recorded in Foochow, thirty-four years ago, and if the perhaps not very trustworthy reports of the inhabitants are to be relied upon, no snow has fallen there for two hundred years. At Hong-Kong, in Lat. 22° 18′ N., while there was no snow, the mercury on two nights, January 17th and 18th, fell to the freezing point, and water froze in open vessels and tanks to a thickness of a quarter of an inch. The effects of the storm upon the vegetation were very disastrous. The banana plantations of Canton were destroyed, and the sugar-cane and potatoes of Swatow suffered greatly. The palms, singularly enough, seem to have best withstood the visitation of cold, while the begonias, crotons, bamboos, etc., were badly nipped. It is interesting to note that the sensitive plant (*Mimosa pudica*) lost in great part its sensitiveness, which only returned on the application of hard pressure.

THE ARCTIC EXPEDITIONS.—The several Arctic expeditions of this year, which carried with them the bright hope for success, have been alike doomed to failure, and once more the Arctic problem presents itself in the garb of the unconquered past—an enigma to be solved. The crushing of Wellman's vessel, the *Ragnvald Jarl*, by the northern "pack" off Walden Island, in Lat. 80° 37′ N., virtually ended the expedition in the Spitzbergen Seas; for while a determined effort was for some time made to push forward on the frozen ocean, the condition of the ice was such as to render advance barely possible, and the party were "relieved" by special vessel from Norway. Severe storms buffeted the Peary party almost from the beginning (March 6th) of their march over the inland ice of Greenland, and to the extent of early incapacitating most of the members of the expedition. Of ninety dogs, harnessed to thirteen sledges—upon which a dependence of five months was to have been placed—sixty-five succumbed to exposure and the severe cold within a period of six weeks, most of them freezing into solid blocks. On April 13th, when a distance of barely more than 120 miles had been covered—or only one-fourth of that which was needed to carry the party to Independence Bay, on the east coast, Mr. Peary's first objective point—further advance was given up, and the determined commander accepted defeat. With a strong resolution to accomplish his purpose, however, Mr. Peary (after seeing the major portion of his party safely transferred to a relief vessel which had been sent to his assistance) has determined to try the fortunes of another year, and with two of his associates, Hugh J. Lee and Matthew Henson (colored), again face the Arctic night. At the time of this going to press news is received of the partial imprisonment of the Jackson-Harmsworth Expedition in the icy sea north of Nova Zembla, and their failure thus far to reach Francis-Joseph Land, the proposed base of operations. It is, however, too early to prognosticate the chances of this expedition, or to foretell its fate even for a few days. The past winter appears to have been one of unusual severity in the Arctic regions, but it is hardly to this cause that the failures are to be attributed. Rather they must be sought in the combination of vague circumstances which help to make Arctic ventures true ventures. The absence of real casualties in the several expeditions is a bright spot in the annals of northern discovery.

MAGNETISM OF ROCK PINNACLES.—The Rev. Mr. Hill, of Cockfield, England, sends to *Nature* the following interesting note on the magnetism of rock pinnacles: "It is well known that the Riffelhorn powerfully affects the compass, and the like has been observed on other peaks in Switzerland; but I have never seen any record of similar observations in this country. Four years ago, on a visit to the Lizard, accident drew attention to a strong influence on the compass exhibited by a crag on the moors near Kynance. I have taken the opportunity of a visit this year to ascertain whether that were a solitary case. I find that such influence, though not general, is by no means uncommon. Most of the rocks in which it was observed were serpentine; it occurred also in hornblende schist; there were no sufficient opportunities of testing the other rocks of the district. The influence was exhibited only in prominent crags, but among them often in lower adjacent blocks, as well as in the absolute summits. At a few yards' distance it was always imperceptible. I saw no traces in any case of the crag having been struck by lightning. This was the only point to which I gave attention; but it would be natural also to inquire if all kinds of rock can possess the property, if wet or weather affects it, and if it be temporary or permanent. I used a common pocket compass, taking the bearings of some distant object, first a few feet off, then in four surrounding positions as near as the compass could be held to the stone I was testing. The effects varied from no deviation or slight, to cases where the needle swung completely round while still a foot or two away." The interesting phenomena referred to by Mr. Hill have also been noted in other regions.

A TRANSPYRENEAN RAILROAD.—A new project for the tunneling of the Pyrenees, and of uniting France and Spain by means of a direct railroad, has recently been formulated and ratified by a convention of delegates from the two countries. Two "international" lines are in consideration; the one starting from Saint-Girons, in Ariège, and passing by way of the valley of the Salat and of Noguera-Pallaresa, to terminate at Lerida; and the other, leaving Oloron, in the department of Basses Pyrénées, and passing by way of the valleys of Aspe and of the Gallego, to Zuéra, on the line connecting Saragossa with Barcelona. The time of construction is not to exceed ten years beyond the date of ratification; at no point of either line is the gradient to be more than 33 millimetres per metre, and at no point, except where exceptional conditions of construction present themselves, and where judgment shall be determined by statutory enactment—are the radii of curves to be less than 300 metres. The tunnel of Somport, which is planned to leave France at the forges of Abel, at an elevation of 1064 metres (3490 feet), and to emerge at Aranones, in Spain, at a level somewhat more than 400 feet higher, will measure four and three-quarter miles in length. The second tunnel, that of Salat, will enter and leave the mountains at nearly the same elevations, and will have a length of nearly five and a half miles.

MR. PEARY'S STRUGGLE WITH THE EQUINOCTIAL.—The arrival of intelligence from Mr. Peary throws a vivid light upon the conditions which interposed themselves to the success of his ill-fated expedition. All reports agree in stating that the past winter was one of exceptional severity, and probably few expeditions had more to contend with in an equal period of time than the present one in its effort to cross, in the month of March, the great ice-cap of Greenland. The following graphic account by Mr. Peary, contributed to the New York *Sun*, of his party's experience in the memorable equinoctial period of 1894, will give some idea of what Arctic travel may mean :

As soon as Clark and myself had had a cup of tea and some biscuit, camp was struck, the remaining sledges were loaded, and we pushed on to the two advanced sledges, where we camped.

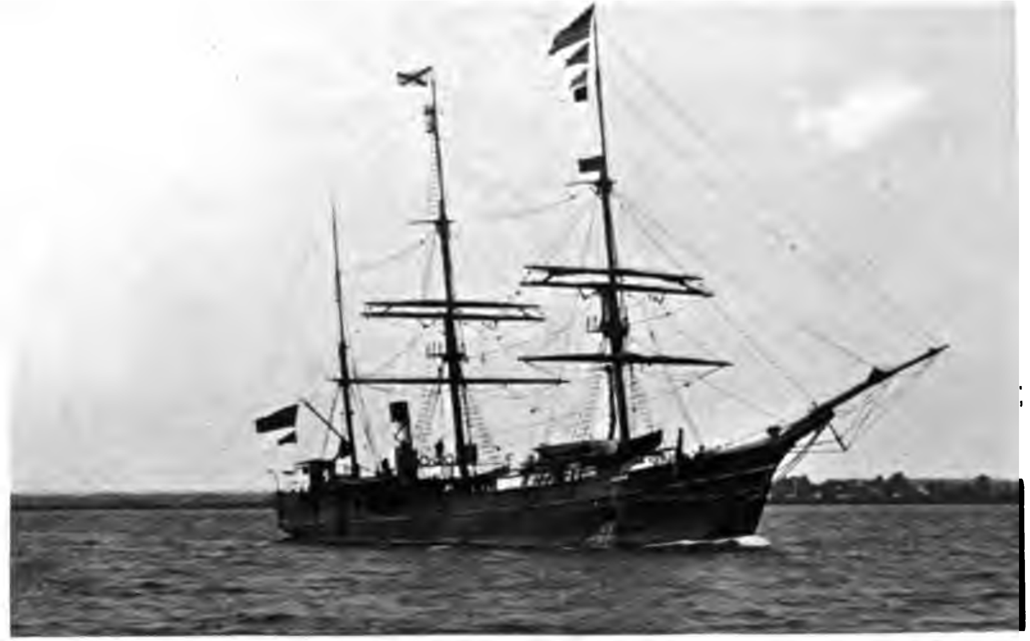
On Tuesday morning, March 22d, although the weather was still very unfavorble, we got under way, but the furious head wind and stinging drift, with the temperature of —35°, compelled us to halt after going only three miles, the dogs absolutely refusing to pull. Here we camped. Entrikin and Baldwin, with their double sleeping bags, took up part of the light protean tent, while the alcohol cooker and myself took the rest. The Doctor, in a single bag, and Clark and Davidson in a second double bag, occupied Astrup's little silk tent. The dogs were fastened as usual, each team was divided into groups, and, dinner over, we turned in. About 5 o'clock next morning I was awakened by a sudden increase in the force of the wind, which now blew with such violence that, had not our tent been all in one piece, connected with the floor cloth on which we were lying, I should have expected to have had it blown away at any moment.

The drift which accompanied this storm was almost indescribable, and had the members of the party been any less perfectly clothed than they were, it would have been impossible to have gone out of our shelter. As it was, however, Baldwin made his regular observations at the observatory sledge, about 100 feet from the tent, and he and I took turns in carrying hot tea and pea-soup to the three men in the silk tent, about fifty feet distant. Throughout the day and the following night the wind steadily increased in violence, until it became impossible to shout so as to be heard from one tent to the other, even with the utmost effort of our lungs.

On Thursday afternoon the drift forced an entrance into the silk tent and in order to escape being smothered its occupants were obliged to get out as best they could and retreat to the larger tent. In doing this Davidson had his heel, and Clark a toe, two fingers and a thumb frostbitten. As soon as they were safely in our tent, Entrikin turned out of his bag and gave his place to Clark. I turned my deerskin sleeping trousers over to Davidson, and the Doctor curled himself up on the foot of the big bag. This left a small space between the pole and the tent opening, in which Entrikin and I could stand. This space was constantly decreasing in size from the drift, which, in spite of our best efforts, continued to force itself through the fly, after the entrance of the boys. After a time there was room for only one of us, and we alternated in standing up, steadying ourselves by the pole, now and then curling up on the snow-drift for a few winks of sleep, and making tea several times during the night to warm up the boys and keep up their spirits. The straining and flapping of the tent, the deafening roar of the wind, the devilish hissing of the drift, the howling and screaming of the poor dogs, made a pandemonium never to be forgotten.

One consoling feature was the fact that, owing to the quality and construction of our fur clothing, no one of the party suffered severely from the cold while in the tent. Personally, though without sleeping bag or any other covering beyond my deerskin traveling garments, I was entirely warm and comfortable throughout the storm.

Early on Friday morning, March 23d, the wind began to subside, and at 7 A. M. I was out looking upon a scene that made me sick at heart. Half my dogs were frozen fast in the snow, some by the legs, some by the tails, and some by both. Two were dead, and all were in a most pitiable condition, their fur a mass of ice and snow driven into it by the pitiless wind. Several had freed themselves and had destroyed the double sleeping bag and many of the harnesses which had been blown off the tripods. Baldwin's anemometer, barograph, and thermograph, which, as the result of his ingenuity and perseverance, had kept on recording throughout the storm, showed that for thirty-four hours the average wind velocity had been over forty-eight miles per hour and the average temperature about —50° Fahr., with a minimum of over —60° Fahr. When these figures are considered in connection with our elevation of some 5000 feet, the unobstructed sweep of the wind, and the well-known fact that ice-cap temperatures accompanied by wind are much more trying to animal life than the same temperatures at sea-level, it is believed that the judgment will be that this storm beat the record as the most severe ever experienced by an Arctic party. All Friday was spent in digging out the sledges, feeding the dogs, getting them in shape as far as practicable, and making and repairing harnesses.



PHOT. W. H. RAU.

ARCTIC WHALER "FALCON," OF THE PEARY AND PEARY AUXILIARY EXPEDITIONS, STEAMING UP THE DELAWARE.

September 25, 1894.

Around the World.

VOL. I. NOVEMBER, 1894. No. XII.

HOUSES AND HOUSEKEEPING IN HOLLAND.*

MARIE L. F. MOHR.

IN Holland, as in England, most of the houses are occupied by a single family. Occasionally, however, two families tenant the same establishment, which is then divided into the "Onderhuis," or lower house, and "Bovenhuis," upper house. Naturally, with such conditions, the structure of the houses departs broadly from that of houses which are inhabited, as in the large continental cities, by six or eight, or even more families. There are no large tenements, and rarely do the houses have more than two stories, to which the internal arrangements are made to conform. Manifestly, with the advantages of single habitation, and with the passage-ways used by the members of the family alone—the various providers, butchers, bakers, greengrocers, milkmen, etc., being attended to by the servants beyond the precincts of the front door—a degree of cleanliness can be maintained which is impossible in the apartment houses of Germany and France, where the dirt and uncleanliness of the common stairways stand out in such violent contrast to the beauty and grandeur of the outer fronts. The Hollander is preeminently the lord of his domain, and to him well applies the saying, "my house is my castle;" no intruder dare enter it without his permission.

If the simple architectural form of the Holland houses gives to them a sober exterior, lacking, perhaps, entirely in what might be called style or design, the deficiency is more than counterbalanced by the degree of comfort, of home-feeling, which the interior presents. In the entire arrangement, which, if the expression may be permitted, has been developed through a common-sense cost, there is nothing which is calculated to offend the eye. The long-acquired prosperity of the country asserts itself everywhere ; the land denies itself nothing, and one has but to choose and accommodate himself according to his own preferences, and suit a refinement which is entirely unknown in much less wealthy Germany. Ostentation and boast are foreign to Dutch character—wealth and the enjoyment of life are seemingly nature-born and a matter of course. Many of the Holland houses are costly in construction, but even then are free of show, and, on that account, often unattractive in appearance. The flooring is very generally of white or gray-flecked marble, which oftentimes ascends to the full half-height of the walls. and in the more elegant mansions it is not uncommon to find the ceilings and niches decorated with mythological and figure paintings. In many of the more ancient houses, whose construction dates back to the seventeenth century, and which in their massive walls, silencing all passing sound, would seem to point to eternity for the time-limit of their existence, some of the masterpieces of the golden period of Dutch art are yet to be found. The writer herself occupied a house which had two large drawing-rooms, the walls of which bore the Biblical paintings of Bathasar Moucheron, while the famous De Witt, renowned for his close imitation of sculptural effects, undertook the decoration of the door facings. Again, in an upper room, above the chimney-piece, was a painting of still-life—pigeons and chickens—by Hundecoeter. In other houses may be seen the wall-pieces of Both, the master in his art of sunsets, and equally valuable works are to be found elsewhere.

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* From *Das neue Ausland*—a chapter from "Das moderne Holland."

The amount of room which single occupancy of a house allows of gives to the Hollander the advantage of a number of indispensable accessories to his menage, such as a wash-room, storehouse, closets for buckets and brooms, etc., a separate ironing-room (used exclusively for the purpose of ironing), mangling-room, provided with its own mangle, a coal bin, and another for turf (a species of tan-ball frequently used for heating), and, finally, a room, the "hok," for the servants, wherein the knives are sharpened, the silver polished, and the lamps cleaned. Spare-rooms and store-rooms are almost innumerable in every large house, frequently occupying two full stories, besides the cellar ("vliering").

In all the families of better estate the conduct of the house is entrusted to two or three maids—the latter number, at least, if there are children in the family; and with many families an additional servant, in or without livery, as the case may be, is added. The maids are respectively the cook, chambermaid and children's attendant, who are assigned definitely to their departments, having in them virtually full control, and in no way attempt to interfere with one another's work. They are chosen with a strict regard to competency, and a Holland menage conducts itself under this charge with clock-work regularity, and without the necessity of constant overseeing by the lady of the house. Even the adjustment and disposition of the wash, after its return from the bleaching laundry, is left to the chambermaid or workmaid, as she is more commonly designated. It was the custom formerly for the maids to "adorn" themselves according to their station, with peculiar closely-fitting and projecting hoods, or "kornets," of tulle, closely drawn together by a wire frame, which, even if disfiguring in appearance, were at least picturesque and characteristic. This time-honored custom, together with much that belonged to the "good old times," is rapidly disappearing, and the "kornet" of to-day is merely a tulle cap worn on the back of the head in the manner of the caps of other servants. A Holland maid without such adornment is inconceivable.

One of the pleasantest and most sociable aspects of Dutch life is bound in with the evening tea, which follows the daily meal (of half-past four, five or even half-past five o'clock) by some two and a half hours. At this time the tea-service is spread on the table, the peculiar Dutch szamovar is placed on the floor alongside of the housewife, who herself attends to the disposition of the friendly cheer, and the evening is inaugurated. Guests are ever welcome at these family teas, and when ushered in are immediately presented with a cup of sociability—good and strong, for which the Holland tea is famous. This tea "hour," the duration of which is determined by the continuance of boiling water in the szamovar, frequently lasts well into ten o'clock, and it is in truth the pleasantest period of the living day.

A covered table among the wealthier Hollanders, with its complete service of silver—frequent also among those of lower estate—satin cloths, and crystal wares, even apart from the rich and appetizing foods that are placed upon it, the roasts and the delicate vegetables that are raised upon the moist soil of the country, is a feast to the eye. It is easily comprehended why they, accustomed as they are to the special richness of the products of their own country—the meats, the milk and butter and vegetables, should turn up their noses in foreign parts, and this the more readily as the grandeur of life in countries like Germany, France and England does not to them replace their own domesticity. The Hollander is preeminently a leisure-loving man and man with family instincts—characteristics which are firmly bound in with the literature and art of the country.

The Dutch are hospitable in the good old meaning of the word. They like their friends, their visits the more as they are oftener repeated, and they do not find it necessary to extend invitations to ensure such calls. Uninvited or invited you are sure of a hearty welcome, and this welcome is made home-like to all by the absence of all ceremony and special effort to please. You are received as you come, and go as you came—a member of the household. People of prominence or distinction are received with a hospitality and courtesy recognizant of their station, and with a feeling of honorable pride they are brought together with friends and relatives. One must have himself alone to blame if under favorable conditions he does not in a short time acquire a large circle of friends.

THE British North Borneo Company offers to young men in possession of an available capital of £2000 sterling free possession of 500 acres of land, suitable for the cultivation of coffee, tobacco, cinchona, and the cocoa-nut.

CANAL-BOATING AS A SUMMER RECREATION.

OF the many enjoyable turns of which a summer outing is capable none perhaps is calculated to give more lasting pleasure, and true pleasure for the time, than a journey by canal boat. In this country canal-boating is still an unlearned art, and is probably known to a fewer number of persons than any other form of traveling. Yet it is easily accessible to a very large proportion of the traveling community, more especially in the eastern United States. The reason for this neglect is perhaps due to the slow rate of travel and to the fact that almost everything pertaining to the canaling business has on its surface a disagreeable aspect. Unsightly heaps of coal appear on deck and in the hold, linen of the days of olden time are strung across a sun-exposed line, or shade off the not over savory deckhouse, and in general a cabbagy odor permeates the atmosphere in which the canal boat rides. Again, it is very commonly assumed that of all the hottest places of this earth, the one pre-eminently so is the canal boat; the deep valleys which it traverses receive a concentrated share of the sun's heat, and naturally a considerable part of it must be absorbed by all who attempt to penetrate along their tortuous windings.

There is certainly an amount of justice to be found in these objections, but objections of a somewhat similar nature could readily be urged against a large number of resorts which are annually visited by throngs of the summer traveler. The truth of the matter is that nearly all the criticism of canal-boating is made from the side of those who have never been, whereas those who have experienced one or more trips of this kind are loud in praise of its merits.

Canaling, like coaching and pedestrianism, has the merit of bringing the traveler closely in touch with nature, and it has the superior advantage of carrying the house of the traveler with him—a comfort that even the one most callous to all forms of country inns can well appreciate. To know that the day's journey can be limited at one's pleasure, and that when over it is over in fact, is at all times a satisfaction, and a relief equally to the body and mind. In its business or "mercantile" form the canal boat is fit only for a "roughing" experience; the deck or the straw-lined hold may serve as temporary domiciles for a few days at most, or as exchanges with some of the more comfortable houses which at miles' intervals press upon the narrow thread of water. But for the quieter and in the end always more acceptable form of canaling, the boats require remodeling—refitting into bunks or stalls, the making of a general sitting or dining-room, location of toilet and washing rooms, etc., all of which can be readily accomplished and with comparatively little outlay. The judicious expenditure of about $250–$300 in lumber, plumber's supplies and labor, will convert the grim and dirty coaler into a neat and habitable house-boat, adapted to a party of twenty or twenty-five, and with privacy assured to both sexes. The first essential of reconstruction is the raising of the hatches by some eighteen or twenty inches, to ensure light and ventilation, and then the fitting over these of impervious canvas to prevent the rain leakages which are otherwise sure to occur. With the changes made, the boat is ready for occupancy, except for the bedding material which the passengers are expected to provide each in his form. Contrary to common supposition the hold is rarely oppressively warm, being well penetrated by the natural air-shaft, and during nights it is apt to be cool or cold, rather than otherwise.

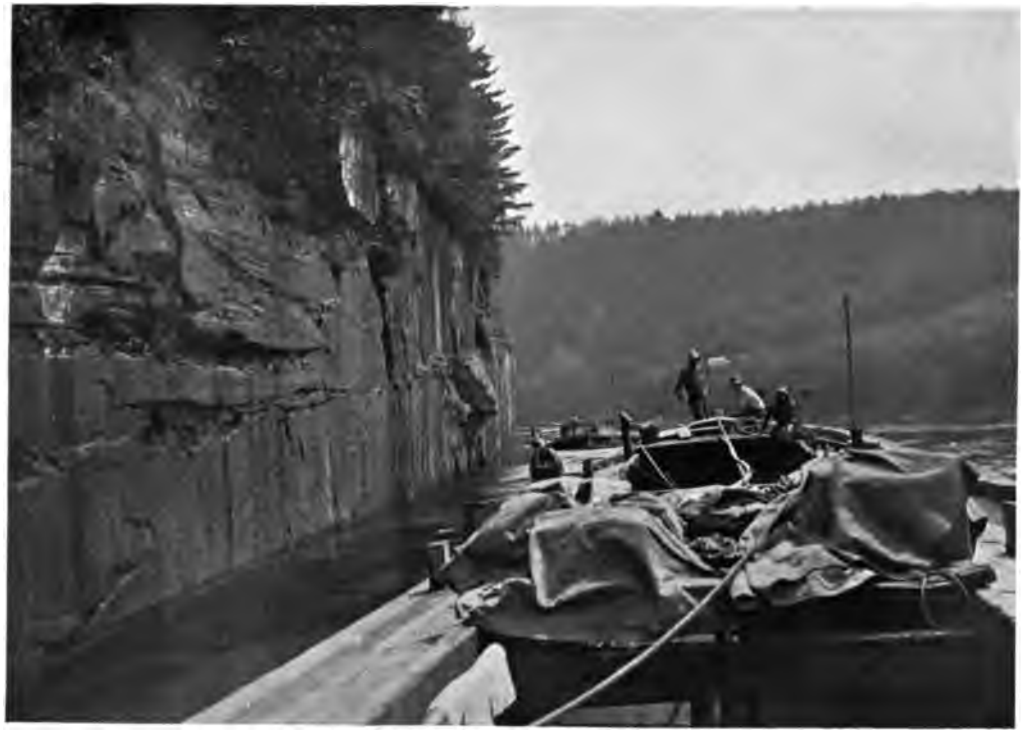
An important element that enters into the consideration of canal-boating is the comparative cheapness with which it can be accomplished. Barring the first expense of reconstruction, which is much more than compensated for by the deficiency of lodging payments at hotels, the daily allowance must necessarily be limited by that which the country around offers, the materials for a good rude fare, cheap in its cost and fresh in its birth, which can always be turned to most savory account in the hands of any half-skillful cook. From $3 to $4 a week will very nicely see a person through for a week, and the other incidentals, including the rental of the boat, services of boatman and the animals of draught, tollage and towage, etc., will scarcely add an additional $2 (and often less) to the individual members of a party of fifteen or twenty.

The navigable water-courses in the eastern United States are long and numerous, and by their inter-communicating ways allow of a broad choice of journey. The Potomac, Susquehanna, Lehigh, Morris and Essex and Delaware and Hudson Canals, among others, may be cited as affording a ready access to the wild and rugged country of mountain and forest, where nature can be selected in a most varied form, and enjoyed under its manifold aspects of peace and savage grandeur. In planning for a journey the fact must not be lost sight of that the widths of the different canals vary, and that the broader boats of one system of waters will not always find accommodation in the waters of another system. Thus, the narrowness of the Morris and Essex Canal, in northern New Jersey, is such as to debar the passage of the full-width boats of other waters ; on the other hand, the narrow "chunkers" are sure to find accommodation everywhere. Again, the length of a canal system need not determine the length of a continuous journey, inasmuch as the river waters, upon which towage can readily be obtained, oftentimes help to unite the canal ways of one system with those of another. Thus, a continuous journey can be made from Baltimore, *via* Philadelphia and New York, to Lake Champlain, by making use of the Chesapeake and Delaware bays, and the Delaware and Hudson rivers, as connecting avenues of travel.

THE BLUE GUM TREE (EUCALYPTUS) AND THE ABSORPTION OF MALARIA.

THE traveler in the south of France, in northern and central Italy, and elsewhere along the Mediterranean, will doubtless have made the acquaintance of the tree, a native of Australia, which for a period of thirty years or more has been actively cultivated both for its ornamental and umbrageous form and for the balsamic qualities which it imparts to the atmosphere. It is a stately figure in the gardens and along the promenades of Marseilles, Nice and the adjoining Riviera, in and about the less hospitable surroundings of Florence and Rome ; on the grand *paseo* connecting the City of Mexico with Chapultepec it forms one of the most conspicuous shade trees. The eucalyptus is for the eastern world, so far as giant stature is concerned, what the sequoia or red-wood is for the American, and perhaps the palm of superiority must be yielded to the former ; it is stated, and on apparently good authority, that trees measuring 350 feet in height are not exactly uncommon, and report claims for them even an occasional 400 feet. The special interest that, however, attaches to these trees is their supposed quality of arresting or abating the malarial tendencies of malarially-disposed regions—a quality that is associated with their power of rapidly drying moist soil, through imbibition by the roots, and the balsamic saturation of the atmosphere. So strong is at times the odor given off from "the leaves and all parts of the tree, that, under ordinary atmospheric conditions, the air around is impregnated therewith."

The high hopes that have been entertained regarding the febrifugal properties of the blue gum appear not, however, to have been realized. That the rapid absorption of moisture from the soil, and the consequent laying dry of swampy tracts, is a beneficial quality cannot be denied, but the propagation or residence of malaria is seemingly dependent upon too many conditions to permit of its course being materially checked by the reversion of one of these conditions alone. In reply to a circular letter addressed by the Consular Bureau to a number of American consuls in Europe, bearing upon the history and uses of this tree, a variety of information has been received, with the weight of evidence inclining doubtfully to any assumed very great change in the salutary conditions of the regions where the tree has been planted. The most circumstantial statement is contained in the reply of Consul-General Jones, of Rome, under date of March 19th, from which we extract the following : "In order to drain certain portions of the Roman Campagna, the experiment has been tried of planting trees that would absorb a great quantity of water from the soil. With the preconceived idea that malaria is due to putrid decomposition in marshy ground, it has been proposed to make this attempt by means of the eucalyptus. It was thought that these trees of rapid growth would dry up marshy lands and destroy, at the same time, by means of the aroma of their leaves, all miasmatic emanations. 'Up to date (1886)—[according to the report of Professor Crudeli on the climate of Rome]—not a single instance of hygienic improvement by the sole means of eucalypti has been ascertained, but the possibility of so doing is not denied. It can be admitted that these trees sometimes prove useful in certain malarial soils. I frankly maintain, however, that frequently they are of no use whatever, and that it is well to guard against exaggerations that often blind the judgment.' It would have been possible to avoid these exaggerations and the disappointments which followed as a consequence, if, instead of regarding these plantations from a theoretical point of view, the public had begun



PHOT. MRS. L. WOODBRIDGE.

CANAL-BOATING ALONG THE UPPER DELAWARE

by studying their results in the very home of the eucalypti. It would then have been known in time that even in the southern hemisphere, where the eucalypti thrive better than with us, there are forests of eucalypti in which malaria reigns supreme, as has been stated by Professor Liversidge, of the University of Sydney. In Italy, although the newspapers had persuaded every one that the farm of the 'Tre Fontane,' near Rome, had become healthful by means of the eucalypti, it proved a disagreeable surprise to learn of a sudden outbreak of malaria in 1882 that caused much sickness among the farm hands, while the rest of the Campagna remained particularly healthful. . . . Dr. Montechiare, a practicing physician of Rome, who for years was physician to the penal colony at 'Tre Fontane' [the site of a Trappist monastery, on the road to Ostia, three miles from Rome], tells me that his experience justifies him in declaring that no beneficial result against malaria has been derived from the planting of the eucalyptus. The monks set out no less than 50,000 trees on a few acres. Had the efficacy of the eucalyptus proven real the entire settlement of 'Tre Fontane' would have become a veritable Eden on account of its wholesome, balsamic air, which has by no means been the case. In 1870, Dr. Montechiare, being in charge of St. John's Hospital, experimented with all the preparations of eucalyptus against malarial fever, and found that not one lowered the temperature of the patient by a tenth of a degree "

The remarkably rapid growth of the eucalyptus is shown in the report of Consul Wilburn Hall, of Nice, who states that in his own immediate neighborhood a tree, "planted by a friend less than four years since as a little shoot about the size of a man's thumb, is now more than thirty feet high, after having been constantly kept trimmed down and nearly one foot in diameter. Trees of great size in this portion of France are said to be less than twenty years old."

THE number of steamers on the waters of European Russia was, in 1893, 1778, an increase of 40 per cent. over the number in 1885. The distribution was as follows: Volga, 1010; Dnieper, 218; Don, 138; Dniester, 14; Düna, 63; the Neva and associated lakes, 207; Narva (Luga and associated lakes), 18; Dwina, 76; Niemen, 11, and Vistula, 23.

AN EXPERIENCE OF AUSTRALIAN TRAVEL.

GUY BOOTHBY.

THE following experience, taken from Mr. Boothby's recently published work, "On the Wallaby,"* gives some notion of the dreadful sufferings that are yet to be encountered in an Australian journey:

The first night out from Windorah we camped on a small, almost dried-up waterhole, near where we had spent a night on our downward journey. Here our supply of native hay stood us in good stead, and we blessed our foresight in bringing it; had we not done so, our horses would have been compelled to go entirely without.

Long before sunrise next morning we woke to enter upon the most eventful twenty-four hours of all our wanderings. Almost in silence we ate our meagre meal and prepared for the journey. The horses had not wandered from the camp, but had stood throughout the night with dejected bearing just beyond the fire. Their very attitudes seemed to presage some misfortune. While the Long'un harnessed the two new animals, I broke up the camp and packed the buggy. With tears streaming down his face, Mr. Pickwick mounted to his place. We ranged ourselves on either side, and the march commenced.

Departing from the track, we plunged into the scrub and steered for Welford Downs. Among the trees the heat was stifling. Only the rattle of our progress (for our old buggy on the march was as noisy as a tinker's van), the dismal caw-caw of the crows, and the grating of cicalas in the trees was to be heard. In this fashion for hours we crawled along, making the slowest progress. At midday we camped for a brief space to give our animals a small supply of the valuable hay, and as soon as it was eaten resumed our march till sundown.

As the sun sank behind the trees, we began to look about us for the waterholes we had been assured we would strike, but not a sign of one was to be seen. On and on we struggled, keeping a vigilant lookout, but at length, when darkness fell, we were obliged to give up the search and camp where we were. As they had been pining for water all day long, this dry camp meant untold misery for our animals. Fortunately for ourselves, however, we still had our smallest canvas bag nearly full.

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* Longmans, Green & Co., London and New York, 1894.

All that night we lay awake, torn by anxiety, and before the moon had dropped were afoot again. Then occurred our most trying experience. We found that somehow or other, in unpacking the buggy, or maybe it had got jolted out *en route*, we had lost our sole remaining compass—the very thing that was most essential to our safety. In vain we searched and searched, turned out our pockets and packs, hunted over every inch of the camp, and even returned some distance upon our tracks, but without success. It was undoubtedly gone!

Then we began to imagine that Fate must be indeed against us. Our situation was as desperate as it well could be. What to do we knew not. It was impossible to remain where we were, and yet it seemed equally dangerous to proceed. We argued it out in despair. At length, knowing the direction in which we had been traveling the day before, we decided to steer as near to that as we could, trusting to Providence to bring us out on to the river at last.

The horses by this time were in such a pitiable condition that it was impossible for us to add our weights to the buggy, so hour in, hour out, we struggled along beside them, toiling through the heavy sand, preys to the gloomiest and most agonizing thoughts. Then, to add to our anxieties, one of the new horses dropped, and it was some time before we could get him on to his legs again. When we did, we continued our journey as before. He was, however, hopelessly done, and about a mile further went under again. We couldn't stop; there was nothing for it, therefore, but to leave him. Observing the crows hovering about, and noting his condition, we thought it kindest to put an end to him at once, rather than to let these birds pick him to pieces while alive. Accordingly, a kindly bullet terminated his existence, and before we were out of sight, hundreds of crows were perched upon his body, cawing and vehemently disputing it.

All that miserable day, weary and footsore, we struggled on and on. The parched earth, the leaden sky, the dull dead-green trees, the scattered skeletons of perished animals, and the constant cawing of each watchful crow seemed to take the life out of every footstep. The aspect of the country never changed. Clay-pan and sandhill, sandhill and clay-pan, was the everlasting order of the march. At length, towards evening, a terrible discovery dawned upon us. Bit by bit, things seemed to be growing strangely familiar. We noticed trees, etc., we seemed to have seen before, and within half an hour we crossed unmistakably recent buggy tracks. Next moment we recognized the plain upon which we had camped the previous night. *We were "bushed." For hours we had been traveling in a circle!*

This discovery had a stunning effect on us, for besides our idle waste of strength, our water bags were both empty, and there was now no chance of filling them. This last and bitterest misfortune was well-nigh too much for us; it seemed almost better to lie down and die than to struggle further.

Unable to proceed another yard, utterly worn out, we camped where we were, on that hopeless barren spot, not a hundred yards from where we had lain down the previous night. We were too thirsty to eat and too miserable to take any interest in our surroundings. Our wretched horses had not tasted water for nearly forty hours, and were just on the borders of starvation. Poor dumb beasts, their misery was heartrending.

What a night it was! With the rising of the moon, blood red upon the horizon, a soft breeze came moaning like a Banshee through the stunted timber. A morpork hooted at us from a neighboring tree top, ants crawled all over us, neither of us slept a wink, and the horses hardly stirred all night.

Weary and sick at heart, we harnessed up again by moonlight and struck off a little north of east. Before we had proceeded four miles the second new horse showed signs of exhaustion; finally he too dropped and had to be finished off in the same manner as his companion. Again the crows were satisfied.

Then we knew that our only hope lay in lightening the buggy. Accordingly, all our cherished belongings, except absolute necessaries, had to go, thrown away into the sand to become the property of the first wayfarer who should be unfortunate enough to pass that way.

On and on we staggered, cheering each other as best we could. Whenever a hillock came into sight, likely to afford a view of the surrounding country, we climbed to its summit and scanned the district; but only stunted timber and red sandhills could be seen, no sign of water or the river gums. Our own thirst by this time was excruciating, our tongues began to swell and our skin to crack for lack of moisture, yet ever and ever the same picture lay before us: rising and falling ground, deep red sand, clay-pans, mirages, and dried-up water-courses. In addition to all this our stores were quite exhausted. Everything seemed against us. It was agony to walk, and yet we dared not stop. As we both confessed afterwards, it would have been heaven to have been able to lie down and die.

Soon after mid-day, on rising out of a dip, a steep sand ridge presented itself. With infinite pains we toiled to its summit. What the labor cost us will never be understood, but the view which met our eyes amply compensated for everything. We were at last rewarded, for in the valley below us could be seen giant eucalypti, *betokening the presence of the river!* We were beside ourselves with gratitude; we could only stand and point towards it in speechless joy. Then with a speed that was almost frantic we rejoined our horses on the plain and hastened towards that Eldorado. Though it was not more than five miles ahead of us it took us nearly three hours to reach it. What if it should turn out dry? We never thought of that; our only idea was to reach it, if we died in the attempt.

THE CHINESE AT HOME.*

ADELE M. FIELDE.

THE interest that at the present time attaches to everything Chinese is sufficient excuse for the publication of a work on that as yet little known, and as much misrepresented, country. "A Corner of Cathay" comes pleasantly in time, and while it professes to be mainly a record of observations made in the south-eastern portion of the empire, it can well be taken as an essay on the people at large, and to depict the Mongolian as he really is throughout the length and breadth of the land. Miss Fielde is already widely known as a writer on Chinese affairs, being the author of three works dealing with the language and customs of the people, and her experience has been obtained through a residence of fifteen years in the land to which she gave her services as missionary and school-master. Her close and appreciative study of the subtleties of life, thorough acquaintance with the language of her chosen region, and familiarity with the inner customs of the people, women as well as men, make her a safe and interesting leader, from whom we are assured of an accurate statement of facts. The following chapter on "Personal and Household Economy" vividly portrays the Celestial in his home:

Gravity and prudence, the power of foregoing present gratification for the sake of future well-being, characterize the people generally, especially those of the south.

In regard to the first requirement of the body, food, they are singularly free from prejudices which interfere with the utilization of any harmless nutritive substance. Grubs, worms, snails, snakes, squids and jelly-fishes, as well as the flesh of the rat, cat and dog, make for them savory messes, though these are not staples in the markets. The blood of fowl and quadruped is made into edible dishes, and no portion of any animal or vegetable is wasted. Milk and its products are disliked only because they are essentially costly, and therefore uncommon. The ground required for feeding a cow may be planted with pulse, and the pulse will furnish much more of that food-element, caseine, than would the milk of the cow. Beans, peas and lentils, in great variety, and rich in the nutritive elements of milk, are constantly eaten in toothsome preparations, including a peculiar curd which resembles cheese.

Grain, used in food-stuffs, as milled by them, keeps in its flour as much of the outer portion of the kernel as is digestible. Vegetable oils, always cheaper than animal fats, are much used in frying, and for pastry. Brown sugar, one of the chief products of the south, retains its saccharine and its color in numberless confections, and reaches its most attractive aspect in rock-candy. All sorts of fish, fowl and flesh are salted and dried for consumption at seasons when fresh meat is dear.

The appliances for cooking are exceedingly simple. A few thin earthen pots and pans, set upon small clay stoves, over tiny charcoal fires, suffice for preparing a great number of viands. All that is needed for furnishing a kitchen, where the most elaborate meals may be perfected, can be procured for a few dimes.

The custom of cutting all food into shreds and morsels during the culinary process saves time at meals, and diminishes the service required at table. Meats, vegetables and pastries are brought to the board in such form that no knife nor fork need be there applied to them, and only a simple implement for lifting them to the mouth is laid beside the plate. The relegation of all carving to the kitchen vastly simplifies the equipage for dining, without destroying the individuality or diminishing the delicacy of the dishes. The crockery used on the table is therefore of very small size, and the cupboards occupy little space.

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* From "A Corner of Cathay." New York: Macmillan & Co., 1894.

The usual method of lighting a room is by a small saucer of vegetable oil, having the pith of a bulrush laid within it as a wick. This gives an illumination sufficient for reading native books. One quarter of an ounce of peanut oil will thus burn for four hours, but the many who sleep from dark to dawn expend hardly anything on artificial light.

At night, only one article, a straw mat in summer, a cotton mattress in winter, is spread beneath the sleepers ; while a single coverlet, varying in thickness with the weather, is laid over him. As the night-clothes are of precisely the same shape as are those worn by day, faded suits generally render final service in bedrooms.

As the changes of fashion in dress are but slight, a man or woman may, without being out of the style, wear any garment a lifetime. A fixed fashion saves all the wear and tear of nerve incident to cutting by new patterns, and all reckoning as to the amount of cloth required. The only measurements necessary for fitting any individual, are, for a tunic, from the center of the chest to the wrist, and from the neck to the knees. For a pair of trousers or a kirtle, simply the length from hip to ankle is taken. The wearer may grow thinner or stouter without remodeling the garments. This permits one to get costly raiment, and then to lay it away and to maintain for many succeeding years that peace of mind which accompanies a consciousness of being prepared for all social emergencies. It encourages exquisite weaving and rich embroidery, because it allows the possessor of beautiful and costly robes to leave them as useful heirlooms. Women whose fashions in clothing are permanent are morally justified in arraying themselves, as do Chinese ladies, in works of true and high art.

The patterns and the material of clothing are nearly the same for both sexes and all ages. The shape is such that not a scrap of the fabric is wasted in the cutting. When suspended to dry after washing, the cloth hangs straight and requires no ironing. When folded for packing away for the season, or for a journey, the greater the pressure, the smoother the garment when taken out for wear. A large and handsome wardrobe may be kept in three cubic feet of space, and a lady can carry half a dozen dresses in a bundle cinctured by a pocket handkerchief. The weight hangs upon the shoulders, and there is no compression nor restriction of any muscle. While the costume is modest and protective, the amount of fabric used is but small. Seven square yards or less make a complete summer suit, and thirteen square yards a complete winter suit, including all inner and outer garments, worn at any one time by either a man or a woman. In winter warmth is obtained at small cost by quilting raw cotton between light and cheap textures. Four pounds of wadding, judiciously distributed from neck to feet, keep the wearer warmer than would thick and heavy goods, or great expenditure in fuel. In the coldest weather a man may be comfortably and handsomely dressed, in what would be worn at a festival and out of doors, for about $12. This estimate is made from the average of the totals gained by setting down the actual cost of every garment worn at one time by several prosperous men in holiday attire. A woman's raiment has nearly the same value, but $3 must be added for indispensable jewelry—bracelets, earrings, and aigrettes—belonging to feminine costume. A well-dressed man rarely wears, including head and foot-gear, what has cost more than $15 ; and a woman may be elegantly attired, with all her ornaments and for the open air, at an expense of $20.

In spite of all this thrift, the necessary expenses of the Chinese laborer are great in proportion to his wages ; and the vast majority are laborers. While the highest offices are open to every man through the competitive examinations, and though personal property and real estate are secured to their owners, probably not more than one person in ten thousand is beyond the necessity of earning daily bread, or of having his children earn it for him. Wealth is accumulated toilsomely, and there is, as in other countries, an idea that it is dissipated in about four generations.

As a rule, but little of "the unearned increment" is visible about the household. Phlegm, persistence, and frugality account for all possessions. If a man has a wife, two children, and no vicious habits, and works all day for the support of his family, he can scarcely keep the wolf from the door. No one without an income from capital dares marry. The expenses of a household, having only the necessaries of life, as

A MAGISTRATE OF THE MIXED COURT OF SHANGHAI.

is the case in almost all Chinese families, would, for a man, his wife, and two children, be about as follows: rent for one room, $2 a year; decent clothing, made by the wife, $12 a year; food, cooked by the wife, $36 a year. As the wages of a laboring man on a farm, in porterage, or in any work below that of an artisan, are but 10 cents a day, it would take 500 days' work to pay the outlays of the year. The possession of a bit of land, or an income from rents, is therefore deemed essential to the existence of every family. An artisan, whose wages are twice those of the unskilled laborer, could barely support his family.

As only the simplest and rudest machinery is used, either in arts or agriculture, the time required for production makes everything intrinsically costly. The tiny light given by a bulrush pith in a saucer of peanut oil costs the Chinese laborer only one-tenth of a cent an hour; but that represents one-hundredth part of a day's earnings.

The food eaten by the laborer costs on the average but five cents a day, but that is one-half of his day's wage, and so his plain boiled rice, salt-fish, and pickled cabbage take half his time in the earning. His clothing, all woven and made by hand, costs him only $6 a year, but that is sixty days' wages. The farmer's floorless and ceilingless house can be built for $300, but this is as much as he could earn in ten years.

He is saved from extinction by making the utmost possible use of his material; he is saved from envy by being as well off as his neighbors. He suffers because he never invents, and he is lonely because he always works for personal and not general good.

THE ROAD VEHICLES OF GERMANY.

THE United States Consular Reports for 1894 contain the following interesting communication from Consul Tingle, dated Brunswick, Germany, July 10th: It is a matter worthy of observation in Germany that while the roads, even in remote country districts, are the best in the world, being well-nigh perfect, the vehicles which travel them are very nearly the worst to be seen in any country where the farms are so well cultivated, and where the people are so fond of outdoor life. With the exception of the heavy draft horses, used by brewers and transfer companies, the horses are, for the most part, very small, and apparently quite unequal to the burdens imposed upon them. Given, then, magnificent roads and undersized horses, it is odd that the German should not have evolved lighter work and pleasure vehicles. They have not done so, however, and here it is that there appears an opportunity for wide-awake American manufacturers of farm and road wagons to extend their trade.

The German farm wagon is not only heavy and cumbersome, but it is very crude. Briefly, it consists of wide sideboards, forming a triangular trough mounted on wheels, and without springs. The German farmer's grandfather used that kind of wagon; he has never seen any other, and therefore he uses it also He is heedless of the fact that there exist other wagons just as cheap, capable of carrying twice as much, and not half as wearing on the animals which pull them. Such a thing as the light two or four-seated American farm wagon, to be used for reaching market speedily, is not known, though on the splendid German roads it would be extremely practical. The ordinary stout and capacious wagons, of which there are so many well-known makes in the United States, are also unknown.

The case is the same with pleasure vehicles of the highest class. Of course, reference is not made to the large cities like Berlin, Hamburg, Dresden and their surroundings, but to the smaller cities, towns, and their neighborhood. It is true that comparatively recently German manufacturers have been making a kind of four-seated T-cart, modeled on the English vehicle, but it is heavy and cumbersome. The light village cart, dog-cart, or driving buggy is not seen, and this, despite the fact that an undoubted demand exists for a vehicle easily pulled and cheap. The American side-bar buggy, for example, is just the thing for the smooth roads and the undersized horses which characterize Germany. The German is not slow to recognize a good thing when he sees it, and I believe, therefore, that, should these various vehicles once be brought to his notice, their introduction would be accomplished easily.

THE population of Séoul, the capital of Corea, is variously estimated at between 250,000 and 400,000. The *Almanach de Gotha*, which is generally considered to be the most accurate source of statistical information, gives it, according to a census of 1890, as 192,940.

CLIMBING IN THE HIMALAYA.

CLIMBING AND EXPLORATION IN THE KARAKORAM HIMALAYAS.—By William Martin Conway, Vice-President of the Alpine Club, etc. New York: D. Appleton & Co., 1894.

THIS superb volume is a fitting companion to the two great works on extra-European mountaineering that have already been published, Whymper's "Travels amongst the Great Andes," and Meyer's "Across East-African Glaciers." Mr. Conway has the advantage of his predecessors in having extended the vertical limit of his mountain exploits by some 2000–3000 feet, and perhaps this fact fully compensates for the deficiency of the scientific method which has made the other works such standard contributions to science. Mountaineering has within the last quarter of a century or so developed, if not exactly into an art, at least into a craft, and the members who are bound to it are now represented by thousands the world over. As a first result of its precise methods and close cultivation is the demonstration that in all probability all mountain peaks are accessible, or will become such in a short space of time, and that no special hardships need be encountered in any one particular ascent. There is to-day hardly a peak of prominence in the Alps which has not seen on top of it one or more venturesome climbers, all the more important North American summits, excepting those of the far northwest, have been scaled, the highest of the African mountains has been conquered, and deep inroads have already been made into the South American Andes. Attention has latterly been called to the Central Asiatic mountains, and before long, not unlikely, the highest of its summits will be reached. At least this is the opinion of Mr. Clinton Dent, himself a practical student among the beetling cliffs of the Alps, who believes that the main obstacle involved in such a "lofty soaring in the sky" is a deficiency (principally in money) of the wherewithal to properly prosecute the journey.

PIONEER PEAK FROM THE SECOND POINT.

Despite the unmistakable advances that have been made in mountaineering, it is yet a remarkable fact that the highest record forty years ago stood very nearly where it does to-day—a parallel to the record which is shown by the pages of Arctic exploration. If we dismiss the somewhat doubtful elevation of 24,000 feet which it is claimed was made by Graham on the Kabru, in the Kunchinjinga Himalaya, the loftiest spot reached on earth by any man is the summit of Pioneer Peak, about 23,000 feet, the conquest of which constitutes Mr. Conway's chief glory. Yet, as far back as 1855, the Schlagintweit brothers had on the Ibi Gamin reached 22,239 feet; and seemingly their ascent was made with less difficulty than were similar and later ascents by other Alpinists.

The most interesting chapters of Mr. Conway's book are naturally those which centre about his main exploits—the ascent of Pioneer Peak and the exploration of the Hispar, Biafo and Baltoro glaciers, perhaps the longest glaciers of the world if we except those of the Arctic regions. The exploration of the snow and ice-fields involved eighty-four days of almost constant toil, several of which were passed at elevations exceeding 20,000 feet. The facility with which Mr. Conway worked his instruments at this great altitude plainly show that there need be no impairment of one's faculties, through a deficiency of a life-giving oxygen, even at the extreme elevations which man is capable of attaining.

Mr. Conway, as a climber of twenty years' experience, has seen much of the mountain world, and his words regarding mountain scenery are entitled to respectful consideration, if not necessarily to acceptance. The view from the great Hispar Pass (elevation of 17,650 feet) is thus described: "The view ahead absorbed all our attention, for our fate lay in its grasp. It was beyond all comparison the finest view of mountains it has ever been my lot to behold, nor do I believe the world can hold a finer . . . . I forgot headache, food, everything, in the overwhelming impression this majestic scene produced upon me, and the hour and a quarter we were privileged to gaze upon it passed like the dream of a moment. I did not notice what was going on around. The coolies were seated on the snow, and there was eating of food, and the like occupations, in which I mechanically joined. I am informed that no one consciously suffered from the rarefaction of the air, not even Rahim Ali, a man past middle age, and whose home had been in the Punjab and at Abbottabad."

LOWER PLATEAU CAMP.—ELEVATION, 19,000 FEET.

Mr. Conway's party was guided by the well-known Alpinist Mattias Zurbriggen, of Macugnaga, whose experience among the snow mountains of Central Europe was of inestimable value among the untrodden ice-fields of the Himalaya. The author gracefully acknowledges the services of this best of traveling guides, and also of his faithful and exceedingly clever artist, Mr. A. D. McCormick, through whose pen and brush renderings the volume is attractively illustrated. It is much to be regretted, however, that no more use has been made of the photographic method of illustration, for with all regard for pleasing artistic effect. nothing can replace, so far as the values of scenery and geographical construction are concerned, the processes of faithful reproduction from nature. The eye longs for a picture of the Himalayas that can be counted upon as being exact, and which might serve as a means of comparison with the images of other worlds.

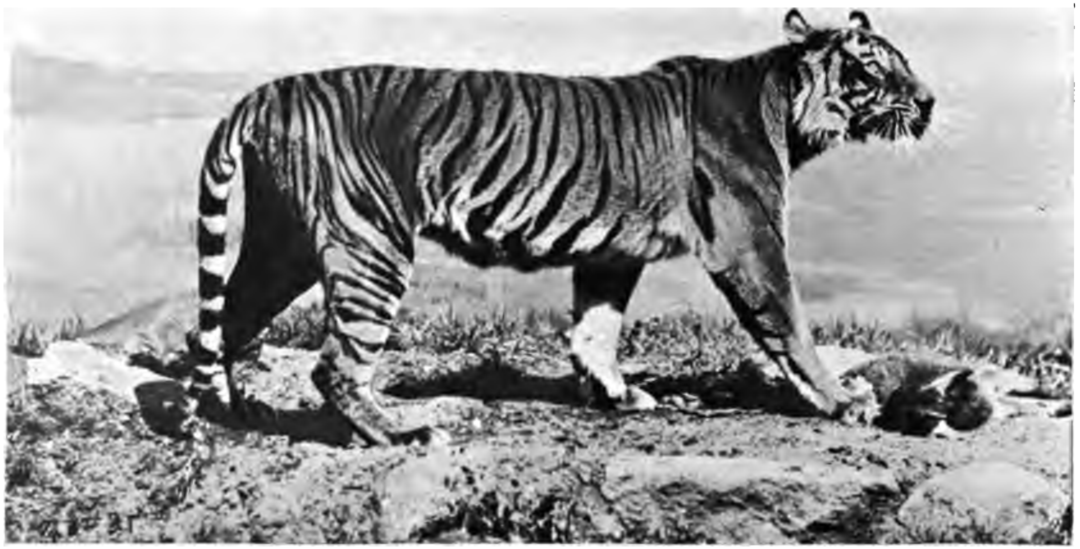
We extract from Mr. Conway's work his account of the ascent of Pioneer Peak beyond 21,350 (22,000?) feet, which conveys a good idea, conceived with an out-of-door effect, of the methods and difficulties of high-mountain climbing in the Himalaya:

From the top of our rock-scramble to the second peak on the ridge (21,350 feet) took an hour and ten minutes, but we were rewarded when we got there by finding, under a kindly rock, a little pool of clear water, more precious to us than gold Amar Sing was overtaken by mountain sickness at this point, and could proceed no further, so we left him behind in a sheltered nook, and, after a tolerably long halt, continued our upward way.

As far as climbing was concerned, the remainder of the ascent was altogether monotonous. The white ridge led up straight before us, and had to be followed. It was of ice thinly covered with snow, and every step had to be hewn with the axe. We sent Parbir ahead for a short time, but though he worked with admirable goodwill, he lacked the skill of Zurbriggen, who presently took the lead once more. Our party, now reduced to five, was grouped on two ropes, Bruce with Parbir being on one, Zurbriggen, Harkbir, and I on the other. Harkbir's carefulness and steadiness were admirable, though he alone was without climbing-irons; Zurbriggen was full of commendations for him.

PIONEER PEAK FROM BETWEEN THE FIRST AND SECOND POINTS

The arête, which we now mounted for two hours and three-quarters, was heavily corniced on our left hand, so that we were forced to keep well on to the right slope, and remained in ignorance of the development of the view in the other direction. Our advance was necessarily slow, and the



PHOT. ANSCHUETZ.

TIGER STANDING OVER ITS PREY.

(Photographed from Life.)

terrible heat which the burning rays of the sun poured upon our heads did not add to its rapidity. There was plenty of air upon the actual ridge, and now and again a puff would come down upon us and quicken us into a little life; but for the most part we were in the midst of utter aerial stagnation which made life intolerable. Such conditions dull the observing faculties. I heard the click ! click ! of Zurbriggen's axe, making the long striding steps, and I mechanically struggled from one to another. I was dimly conscious of a vast depth down below on the right, filled with tortured glacier and gaping crevasses of monstrous size. Sometimes I would picture the frail ice-steps giving way, and the whole party falling down the precipitous slope. I asked myself upon which of the rocks projecting below should we meet with our final smash; and I inspected the schrunds for the one that might be our last not unwelcome resting-place. Then there would come a reaction, and for a moment the grandeur of the scenery would make itself felt. There were three passes at the head of the glacier, between the Throne Peak and the noble white pyramid, the Bride, opposite to it on the south-west. We were far above one of these, slightly above the second, and level with the third. Mountain masses of extraordinary grandeur were showing over the cols, but unfortunately the summits of the highest peaks were cut off by a level layer of cloud. At length the slope we were climbing became less steep. To avoid a larger mass of cornice than usual we kept away horizontally to the right, and presently discovered that the cornice was the actual summit of the third peak on the ridge. We held the rope tight with all imaginable precautions whilst Zurbriggen climbed to the top. He found a firm place where all could cut out seats for themselves, and there at 2.45 P. M. we entered upon well-earned repose.

SNOWY PYRAMID ABOVE FOOTSTOOL CAMP.

The moment we looked round we saw that the peak we were on was the highest point of our ridge. Beyond it was a deep depression, on the other side of which a long face of snow led up to the south ridge of the Golden Throne. From the Throne, therefore, we were utterly cut off. Ours was a separate mountain, a satellite of its greater neighbor, whose summit still looked down upon us from a height of 1000 feet, and whose broad extended arms shut out the view to the north-east, which I so ardently desired to behold. Framed in the passes I have mentioned there were glorious mountain pictures: that to the south, looking straight down the great Kondus Valley and away over the bewildering intricacy of the lower Ladak ranges, being especially fine, and rendered all the more solemn by the still roof of cloud poised above it at a height of about 25,000 feet. When one beholds a small portion of nature near at hand, the action of avalanches, rivers, and winds seems tremendous, but in a deep extending view over range after range of mountains, and valley beyond valley, nature's forces are reduced to a mere trembling insignificance, and the effect of the whole is majestic repose. The clouds seemed stationary above the mountain kingdom; not a sound broke the utter stillness of the air. We ceased to pant for breath the moment the need for exertion was withdrawn, and a delicious lassitude and forgetfulness of past labor supervened upon our overwrought frames. All felt weak and ill, like men just lifted from beds of sickness, but Zurbriggen was able to smoke a cigar.

The moments were precious, and each must be used to the best advantage. Owing to the sickness of two of the Gurkhas, the number of instruments that could be carried up was fewer than I intended. The theodolite had to be left below, and its place taken by a light clinometer and a prismatic compass, which could be carried in the pocket. With these I took a round of angles as carefully as I could. Then I photographed the panorama twice round. The turn of the plane-table came next, and I was able to sketch in an important addition to the glacier survey Meantime the barometer, which had been set up, had accommodated its temperature to that of the surrounding air (54° Fahr.). It stood at 13.30 inches, which gave for our altitude 22,600 feet. The summit of the Golden Throne was about 800 yards distant horizontally, and elevated at an angle of 25°. We were therefore approximately 1100 feet below it.

If the G. T. S. value for the height of K.2 is correct, the Golden Throne must be 24,100 feet high, and the height of Pioneer Peak is over 23,000 feet. Finally I took tracings with the sphygmograph of Zurbriggen's pulse and mine; and here the damaging effect of altitude made itself apparent. Our breathing apparatus was working well enough, but our hearts were being sorely tried, and mine was in a parlous state. We had all practically reached the limit of our powers. We might have climbed a thousand feet higher, or even more, if the climbing had been easy, but Zurbriggen said that another step he could not cut. If we could have had tents and warm wraps and spent the night at this point, we might perhaps have been able to restore our forces, and to have climbed 3000 feet or more on the following day; but I doubt it. We were all weakened, not so much by the work of the previous hours as by the continued strain of the last three weeks. There was no debate about what was to be done next. All recognized that the greatest we were going to accomplish was done and that henceforward nothing remained for us but downwards and homewards.

We remained on the top till nearly four o'clock, for it was hard to give over repose, and harder still to tear ourselves away from a scene so magnificent and so rare. The southward vistas, which were wholly new to us, of course chiefly arrested our attention on the moment of arrival on the summit, but it was westwards, down the valley we had mounted, and far, far away to the north-west that the vastest area was displayed to our wondering gaze. Gusherbrum, the Broad Peak, and K.2 showed their clouded heads over the north ridge of the Throne, and were by no means striking objects. Further round we looked straight down the Throne Glacier to its junction with the Baltoro, right above which rose in all its constant majesty the finest mountain of this district, second only to the unsurpassable Matterhorn for majesty of form, the Mustagh Tower. It is a peak of great height. Beyond this and the neighboring Mustagh peaks came the Biafo Mountains, and those that surround the Punmah Glacier. This was but the foreground. Away the eye wandered to the infinite distance, behind the mountains of Hunza, possibly as far as the remote Pamir. This incomparable view was before us during all our descent, with the evening lights waxing in brilliancy upon it, and the veil of air becoming warmer over it. The high clouds that overhung it became golden as the sun went down, and every grade of pearly mystery, changing from moment to moment, enwrapped the marshaled mountain ranges that form the piled centre of Asia and send their waters to the remotest seas.—[Mr. Conway's work is supplemented with a detailed map of the region traveled over.]

THE HABITAT OF THE TIGER.

ONE of the most surprising facts that have been brought out by the Russian scientific expedition to northern Siberia in 1885–86, the results of which are now being published, is that the tiger in comparatively recent (although probably prehistoric) times ranged far within the Arctic regions, leaving its bones firmly imbedded in the deposits of the Yana River, and of the Liakhov or New Siberian Islands (in 73° N. Lat.). That the tiger is not, as is generally supposed, a strictly tropical animal has long been known to naturalists and travelers. Middendorff, already in the first quarter of the century, had mentioned its occurrence, along the southern face of the Stanovoi Mountains of Siberia as far north as the 55th parallel of latitude, and the animal has frequently been reported from the neighborhood of the mining town of Nertchinsk, in Trans-Baikalia. Radde mentions the animal as being particularly abundant in the valley of the Amoor, and in southwestern Siberia it has been traced to Barnaul, on the 53d parallel. But the enormous northerly extension which is now given to it—to a point way beyond the confines of continental Europe, and even beyond Disco, in Greenland, where the pall of winter hangs for nearly three-quarters of the year, and where the highest form of vegetation barely exceeds a few inches—will be a genuine surprise to all students of geographical distribution, and a lesson in climatic associations which must be received with the full consideration that it merits.

That the remains in question, which have been carefully reported upon by M. Tscherski, could not have been carried northward from some more southern locality by a north-flowing stream, such as the Lena, is proved by the condition of occlusion which characterizes the basin of the Yana. That the most northerly of the remains, those of Liakhov Island, may have been discharged to their present locality by the river Yana is possible, but this does not measurably decrease the interest in, or importance of, the discovery, as the basin of the Yana itself lies well within the Arctic circle. The condition in which the remains were found, moreover, point to the occupancy of the region during a cold period (post-glacial), when, seemingly, the climatic relations could not have been very different from what they are at the present time. The discovery is a significant one in whatever light it is viewed.

MOUNT DESERT AND ITS FLORA.

Flora of Mount Desert Island, Maine.—By Edward L. Rand and John H. Redfield, with a geological introduction by William Morris Davis. Cambridge (Mass.): John Wilson & Son, 1894.

TO the many who annually visit Mt. Desert Island, not only for the "summer sensation" and for the inhalation of fresh ocean breezes, but for the higher enjoyment of communing with inner nature, the present modest volume of 280 pages—a model of book-making—will come heartily welcome. Botany and geology are each in themselves sufficiently attractive subjects of study, but where they combine with a region that is already so largely favored with the gifts of nature, as is Mt. Desert, they acquire a special attractiveness which little else can replace. The charm of exploration is determined not alone by the magnitude of discoveries to be made; a new wayside plant, a new demonstration of an old law in geological physics oftentimes gives to the student the same pleasure that does the discovery of a new land-mass to the traveler or the treading of a new mountain crest to the mountaineer. This form of study should be encouraged for the happiness which it yields, and in no better way can this be done than by the publication of *standard* local works of natural history.

The authors of the work before us are well-known specialists, and their names are a guarantee of the full reliability of their publication. From the introduction we take the following compact description of the region studied by them, as a chapter of descriptive American geography:

Mt. Desert Island, called by the Indians Pemetic, lies about 110 miles east of Portland, on the coast of Maine, and less than half that distance from Rockland on the western shore of Penobscot Bay. Its coast is washed by the Atlantic Ocean on the south, by Blue Hill Bay and its tributaries on the west, and by Frenchman Bay and its tributaries on the east and north. On the northwest Mt. Desert Narrows, a shallow strait connecting the waters of these two bays, is crossed by means of two bridges, connecting Thompson Island with the mainland on the north, and with Mt.

Desert Island on the south. The area of the island may be estimated at about 100 square miles; its greatest length being about 15 miles, from Hadley Point in Eden on the north to Bass Harbor Head in Tremont on the south; its greatest breadth, about 12 miles, from Great Head in Eden on the east to The Cape in Tremont on the west. The coast line, especially of the southern and western shores, is extremely irregular. Up the center of the island for fully half its length from north to south, through the mountain range, passes the fjord of Somes Sound (or "The River"), a deep arm of the sea, dividing the island into two almost equal sections. Across the center from Western Mt. on the west to Newport Mt. on the east stretches the granitic range of mountains that has given Mt. Desert its name, rising almost from the sea to heights varying from about 300 to over 1500 feet. Towards the north the ground slopes to the farming lands of Eden and the great meadow of the Northeast Creek, and towards the southwest to the meadows of Marsh Creek, to Great Heath and the boggy wilderness below the Hio. Between the peaks of the granitic range lie deep valleys, filled either by an arm of the sea, as Somes Sound, or by a lake or pond of more or less magnitude. These are mountain ponds for the most part, many of them of great depth, with rocky shores broken by stretches of sand or gravel beaches. None of the streams are of much size, and the regularity even of their natural flow has been greatly diminished by the wanton destruction of the woods about their watersheds.

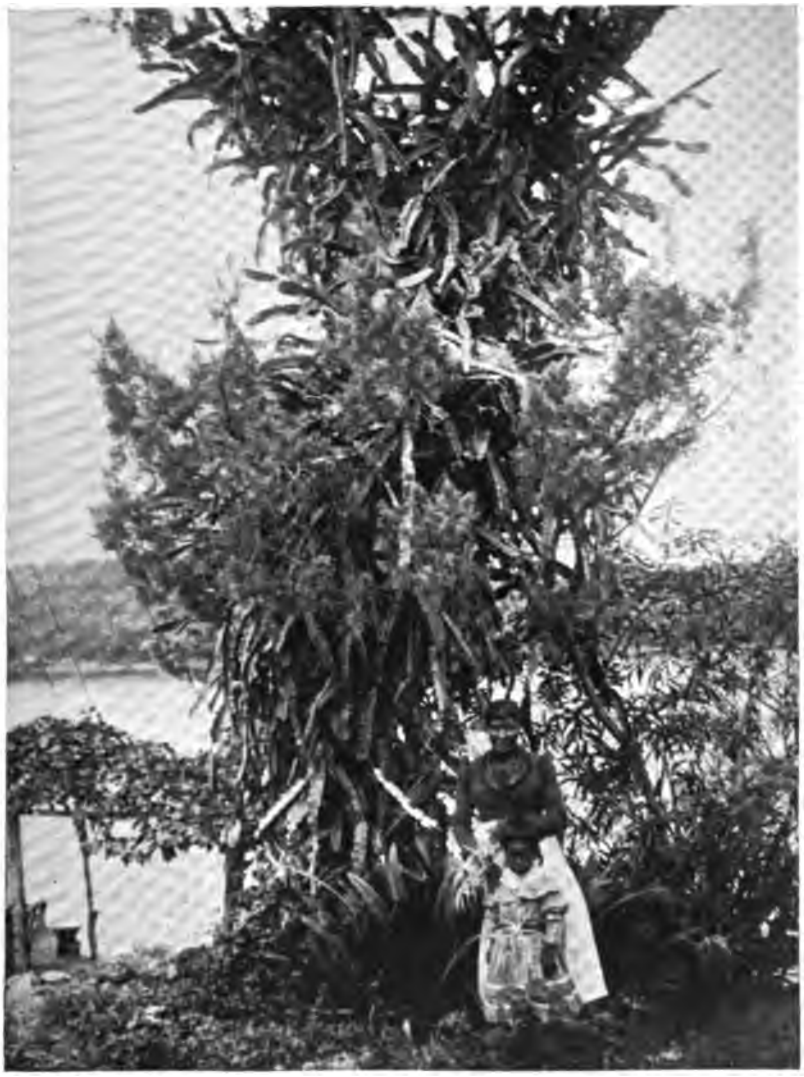
The flora of Mt. Desert is an essentially Arctic one, and this in fact is its most marked peculiarity. Fully 230 of its flowering plants are also plants of the Arctic regions, and many of these link the flora to the more specially Alpine flora of the White Mountains. It is little wonder, as is well said, that on the coast, which is enveloped in cold fogs and washed by waters chilled by the Arctic current, the more northern plants should find a congenial home; but the same physiographic conditions which determine the vegetation of the coast borders seem also to extend to the mountain summits, for it would appear that with the exception of a single species of club-moss (*Lycopodium selago*), all the mountain plants descend to the sea-level. The flora is thus distinctly Canadian in its direction, with a directest leaning to that of New Brunswick. "Neither on the one hand is the altitude of the mountain summits sufficient to develop an Alpine flora, nor on the other hand is the warmth and general character of the lowlands sufficient to bring many of the plants of the middle temperate region thus far up the coast of Maine."

Another marked peculiarity of the Mt. Desert flora has until recently been the absence of the ordinary exotic or introduced weeds, those members of a country's vegetation which so often mask the true characteristics of a native flora. In the case of the region under consideration this deficiency is explained, and probably correctly, by the fact that the limitations to agriculture have been too great to permit of man's interference with the simple growth of nature, and the soil has produced mainly that which properly belonged to it. Of late, however, with the rapid inroads that all forms of civilization are making into the island, this is in a measure being changed, farm and garden weeds are stealthily creeping in, and the general struggle for supremacy is entering upon its race for life.

The book is supplemented with a large-scale map, and incidentally it contains a common-sense treatment of the aims and purposes of "scientific classification," which will be approved by all who believe that classification is only a minor part of science, and that its too free handling is an impediment to the progress of research rather than an aid to it.

A FRAGMENT OF BERMUDIAN VEGETATION.—THE NIGHT-BLOOMING CEREUS.

THE traveler in foreign parts is surprised by nothing more than by the changeable and varied effects of the vegetation that constantly appeal to him. Plant-forms that were well known and dear to him in his native home have been replaced by others less, or perhaps not at all, familiar; some again have become so modified and appear in so strange a guise as to be barely recognizable—in many cases entirely so. Every traveling botanist knows the sensation of being surprised in a new country; how the trees and shrubs with which he thought himself fully familiar in the regions of his earlier studies appear in new forms, new colors and new dimensions. The world has seemingly changed for awhile, only to confuse and astonish. With equal surprise the horticulturist views the



PHOT. T. LE BOUTILLIER.

NIGHT-BLOOMING CEREUS.—ST. DAVID'S, BERMUDA

difference of effect between nature's workings and his own—a difference that in many cases even the broadest imagination refuses to compass.

The traveler from the United States has to wander but a few hundred miles from the centre of commerce of his own land to find some of the most striking pieces of vegetation that are anywhere to be met with. Not that the Bermuda Islands exhibit a special luxuriance in their plant life, or a luxuriance that even approximates that of the more favored parts of the tropics or subtropics. There are neither forests nor jungles, no broad savannas or rolling prairie; a country of gentle undulations, covered more or less closely with grass and scrub, feeble thickets and extensive cultivated patches, is the expression of the tiny patch of land which nature has reared out of the sea. But within it have been developed a few incidentals of vegetality which seek their rivals elsewhere, and which by their diversity unite the far corners of the world. The coffee-tree, screw pine, banana, oleander and bamboo are strictly strangers to the land, as are also the royal palm, cocoanut, date and India rubber; but they have received the care of a fostering hand, and under its influence have developed into that mature form which one habitually associates only with a true home. It would be difficult to find more stately specimens of the palm tribe than the five "royal" shafts of Pembroke Villa, or a more magnificent India-rubber plant than the colossus of Par-le-Ville. Under its umbrageous canopy, supported by a trunk of the dimensions of a giant oak, a full regiment could verily camp. And how are the long lines and hedges of oleander, 20 and 30 feet in height, to be described with the breath that knows only the diminutive plants of our parlors! But the most wonderful of the Bermudian plant constructions, and well-meriting a journey to this off-land for their sake alone, are the giant creeping or climbing cactuses, which in an exquisite, even though lowly and modest form, are known to us as night-blooming cereus We recognize a splendor in their single flower, or it may be that two or three of the wondrous blossoms open for a single night. It is hardly to be credited that the same plant in the Bermudas exceptionally throws out as many as 100 or even 200 blossoms in the almost unseeable darkness of a single night. The writer, in July, 1888, was witness to a florescence of 242 blossoms, the plant supporting this wonderful burden being large enough to comfortably fill a moderate-sized room; and in the month of August of the present year he was shown the plant which but two days before his visit had dropped 144 flowers. This plant, in its greater part, is shown in the illustration which accompanies this article. It is through plants of this kind that we are brought to realize the wonderful resource that underlies growth in nature.

The night-blooming cereus (*Cereus grandiflorus*) is a member of the cactus tribe of plants, and, as its name signifies, its period of florescence is the night. The plant is properly a native of the West Indies, whence it has been introduced into various countries; it was in cultivation in the Royal Gardens of Hampton Court already previous to 1700. The closing of the flower can be delayed a full day or more by cutting off the bud before it is fully blown, and inserting the cut end in moist sand.

NOTES ON MOUNTAINS AND MOUNTAINEERING.

THE WORK OF A GOOD ALPINIST.—The following itinerary of work accomplished during a single month shows the capabilities of a skilled mountaineer, one endowed not only with the general resources which belong to every good climber, but with a physical endurance and mental determination which are truly extraordinary. The one representing this *tour de force* is Carl Niemetz, whose record is taken from the *Oesterreichische Alpen-Zeitung* of September 28th of this year; it is but proper to state that the guide, Jakob Hofer (or Holzer), of St. Jakob, Tyrol, accompanied him upon his tours. We enumerate only the more important ascents: August 18th–20th, tour of the Mont Blanc, with arrival at the summit shortly after 3 o'clock of the afternoon of the 19th; 21st, ascent from Chamounix to the Col du Géant (11,027 feet); 24th, passage from Breuil to Zermatt, *via* the Theodul Pass and the summit of the Breithorn (13,665 feet); 25th, ascent of the Monte Rosa (15,213 feet); 27th, passage of the Matterhorn (14,700 feet); 28th, ascent of the Furggenjoch (10,860 feet); 30th, ascent of the Obergabelhorns (13,360 feet); 31st, ascent of the Zinal-Rothhorn (13,850 feet). Thus, in a period of less than two weeks, Herr Niemetz had accomplished the ascent of six peaks exceeding 13,000 feet in elevation, cur within the tundra belt, they are almost invariably occupied by groves of fir trees; and conversely, where patches of frozen soil have invaded the forest region proper, they remain as barren tracts, devoid of forest growth. Again, along the drainage channels of rivers, where there is little or no freezing of the soil, a luxuriant tree growth may be expected, and oftentimes it extends far within the domain of what is strictly the treeless tundra.

DO PYGMIES INHABIT EUROPE?—In a paper read before the British Association for the Advancement of Science, Professor Kollmann described the pre-historic settlement which was recently discovered near Schaffhausen, Switzerland, in which the remains of two races were found interred side by side of one another. It is claimed that while the average stature of one of the races was that of the Frenchman of our own day, that of the other was only 1424 millimetres, or 4 feet 10 inches. The race is, therefore, looked upon as one of true pygmies, and as a belonging of the Neolithic (or polished-stone) period. Professor Kollmann also announced the recent discovery in Sicily and Sardinia of pygmies actually living at the present day, and the author believes that they must be regarded, not as diminutive examples of normal races, but rather as a distinct variety of mankind, which, in several types, has been broadly distributed over the globe; he further believes that these pygmy people may be the precursors of the larger types of man, a conclusion for which there as yet appears to be little support.

DISCOVERY OF THE "IRON MOUNTAIN" OF NORTHERN GREENLAND.—As a result of the late Peary Expedition to the north of Greenland, we appear to have the final localization of the "iron mountain" tract, to which the elder Ross first called attention, and whence the Eskimos of Cape York, the so-called "Arctic Highlanders," obtained one of the elements from which they manufactured their native knives and other metallic implements. The existence of these implements, manufactured by a rude people, who were virtually beyond the influence of even the remotest civilization, was a surprise to the early navigator; and not until the past year has it been possible to determine just where the iron-yielding mass was to be found, or what was its extent, and even today the manner of the manufacture of the iron-blades is unknown. Mr. Peary found the so called "iron mountains" to be a mass of meteoric (or telluric) iron, which was partially imbedded in the soil, and has a weight conjectured to be from two to three tons, or possibly more. Its position is on the northern bight of Melville Bay, east of Bushnan Island, about twenty miles from Cape York.

AN INUNDATION IN MARS.—Mr. W. J. Lockyer, in an article on "Mars as He Now Appears," contributed to *Nature*, under date of September 13th, discusses the condition of the planet in the light of the observations that have latterly been made upon its face by Percival Lowell and Professor Pickering. His most interesting conclusion, drawn from certain features in the neighborhood of the great polar ice-cap, is thus stated: "With such facts before us, it is hard to believe that we are not observers of a great inundation, which obliterates, or nearly so for a time, all landmarks lying anywhere in the region 20° or more south of the equator. The source of this flood would, of course, be the rapidly melting snow, and the great volume of water now liberated from the solid form, and forming at the boundary of the cap the dark narrow belt, would be ample to account for the disappearance of islands, blurring of coast-lines, and such like phenomena. Certain are we that these landmarks are *there*, and the only justifiable cause of their dimness of outline and color is the hypothesis of their partial and sometimes total submersion."

CANNIBALISM IN THE BISMARCK ARCHIPELAGO.—In the group of small islands neighboring upon New Guinea, to which the name of the great German statesman has been given, this loathsome custom, according to the report of the explorer Baron Pfeil, still seems largely to prevail, especially in regions, such as New Ireland, which are not visited by whites. The main sacrifice is obtained from prisoners of war or from foreign captives. Only men are privileged to participate in the *wau*, or feast of human flesh. The inhabitants of the island group are unacquainted with the art of pottery—known to the people of the adjoining Solomon Islands—and hence the preparation of meals is not done by cooking in water, but through heating with ashes or hot stones. On the other hand useful and ornamental wood-work, the making of canoes, etc., is an art which has seemingly been long established with the natives.

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Around the World

MONTHLY.

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F. GUTEKUNST.

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AROUND THE WORLD.

AN ILLUSTRATED MAGAZINE OF TOURS, TRAVELS AND NATURAL HISTORY, DEVOTED TO A KNOWLEDGE OF THE EARTH AND OF ITS INHABITANTS.

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WITH the December number AROUND THE WORLD enters upon the second year of its existence. The favor with which it has been received, both by the general public and by specialists in scientific work, emphasizes the need of a magazine devoted to a "knowledge of the earth," and encourages the publishers to increase their efforts to make the journal an indispensable element in every enlightened household. In its own field AROUND THE WORLD stands alone in this country, and in its pictorial features it surpasses all similar publications of the Old World. The fifty full-page plates which a year's issue presents will alone form one of the finest *livres de luxe*.

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PRESS OF BILLSTEIN & SON.

Around the World.

VOL. II. DECEMBER, 1894. No. XIII.

THE MEDITERRANEAN REGION: WINTERING ON THE RIVIERA.

IT is probably not too much to say that in the wealth and variety of its scenery, in its historic associations and ethnologic relations, the Mediterranean region is incomparably the most interesting of any on the surface of the earth From the moment the traveler enters its precincts until he leaves them he has a continuous feast spread before him for both mind and eye, albeit he may yet suffer the pangs of the same *mal de mer* which belongs to the outer Atlantic world. Following the shores of this great interior sea for their full length, or over a linear extent of some 2000 miles—a distance that might be measured on a line uniting Charleston with the Pacific border—the traveler has presented to him the landscape of Spain, France, Italy, Austria, Greece and Turkey ; Asiatic Turkey, Syria and Arabia appear on the east, and on the south the countries of northern Africa—Egypt, Tripoli, Tunis, Algeria and Morocco. Each of the fourteen regions here enumerated has its own distinctive characteristics—each is clearly differentiated from its neighbor, and to each nature and man have given special charms. So numerous are the attractions that belong to the region that it would be hopeless to attempt to enumerate them ; nor, indeed, is it within the easy power of the tourist to select more than a few of the more interesting localities during a single tour of exploration. Whether he be artist scientist, historian or simple tourist, there is enough to keep him occupied for months, and for months he might advantageously travel without seeing more than a small section of the country. Summer and winter have both their abiding spots, where, in truth, almost every variety of climate can be experienced, enjoyed and denounced.

Of the many more interesting localities of the region none, perhaps, is more favored in that which delights the mind and gives comfort to the body than the stretch of littoral, extending along the French-Italian coast eastward from Hyères to Genoa, which is popularly known as the Riviera. In it nature has concentrated many of her most precious jewels—visions of pure and lofty mountain scenery, snow-flecked and ice-crested beneath an Italian sky—of azure blue sea, and a vegetation of almost tropical luxuriance, bearing the fragrance of the orange, almond and jessamine. To it belong Hyères, Cannes, Nice, Villefranche, Monaco, Mentone and Bordighera, besides a number of localities less well known, in all of which the recreations of health are bound in with the solicitudes of bodily distemper, the outpourings of fashion's purse with the strictures of impoverished deficiency. Over it, backed by the rugged crests of the Maritime Alps, passes the famous Corniche Road ; out from it to the sea, the groves and copses of olive, fig and palm carry with them the warm sunshine which is the inheritance of the landscape. The Riviera, in its good and bad qualities, shares with the north coast of the Mediterranean its well-deserved designation of "the hospital of the world, the flowered cemetery of Europe."

Mr. Hope Moncrieff, in his very admirable "Where to Go Abroad"* thus faithfully depicts the life and nature of this most attractive corner of the globe :

> Looking south over the sea, sheltered to the north by the Maritime Alps and the Ligurian Apennines, *the* Riviera, as it is called, the shore *par excellence*, has a spe-

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* London: Adam & Charles Black.

cially-favored winter climate of much sunshine and a somewhat dry and exciting air, while the rainfall, though heavier, is less frequent than in England. Great, indeed, appears the change from our bleak northern lands to this long strip of picturesque sea-side, where flowers will be found blooming and birds singing in midwinter, though the mountains behind lie deep in snow. But a very short acquaintance with the Riviera shows that the invalid, not even here, can defy the ills flesh is heir to. Disagreeable winds qualify what seems an Eden to the eye; the exhilarating sunshine itself may prove treacherous; and the dust and glare sometimes make one regret the familiar mud and mists of home, where caution comes so much more natural to the sufferer.

These resorts vary considerably in temperature, according as they are more or less protected by the mountain-wall; there is, for instance, 4 degrees of difference between Nice and the East Bay of Mentone, the warmest nook of all, which has a mean winter temperature of 52°. What they all owe to the sun is shown by the fact that invalids are always recommended to choose a room looking south, and that it is the hotel custom to charge extra for these rooms. The night air, indeed, is not found so dangerous as the transition period about sunset; but at all times care must be taken by delicate persons, and warm clothes and wraps are by no means to be left behind as unnecessary because, through the day, one is fain here to use a colored sunshade as protection against the strong shine reflected from so many white walls and roads. Occasional falls of snow have to be reckoned on; it is said that these have become less infrequent of late years, and that the climate of the Riviera seems to be changing for the worse. The terrible earthquake of 1887 also is a warning of what may again happen at any day; yet so strong is the northerner's desire for the sun, that after a year or two the chance of this peril appears to be forgotten.

A generation ago, places like Mentone were a haven of feverish hope to all sufferers from the disease that decimates our youth. Of late years, the introduction of the cold dry-air treatment for consumption has brought the Engadine and other resorts of that class into formidable competition with the Riviera, while on the latter has increased the number of those whom the late Dr. H. Bennet called mere "sun worshipers;" and its most flourishing towns tend to become rather holiday than health resorts, much affected by the idle and wealthy of all nations; this character chiefly centres at Nice and its neighbors, Monte Carlo notorious among them. For young people in good health, the Riviera is a paradise of amusement and more or less subdued gayety. Every large hotel has its tennis court and other resources appealing to English tastes; then, as the guests commonly come for the whole or a good part of the winter, British stiffness thaws, acquaintances are formed, often quickly ripening into something more; congenial coteries come together; entertainments are organized, balls, concerts, picnics, private theatricals or what not; and those who have not to think too much of health or purse can enjoy themselves as if the sun would always shine. The rambles and excursions in this most picturesque region would be enough for the happiness of nature-lovers, yet are too much neglected by the mass of Riviera guests. Lovers of a less ethereal kind have here a scene eminently fit to foster sighs, raptures, vows; and even the mistral does not make Cupid shiver. The robust may bathe in the open air all through the winter, if they can still find any spot sufficiently secluded on the lovely shore, where a tideless sea ripples clearly or dashes its spray against the jagged rocks, leaving no margin of sloppy sand and weed-strewn pools.

Invalids must be referred to medical advice for choice of a sojourn, there being so much difference between the rival resorts; in certain excitable and nervous cases, indeed, the Riviera climate proves harmfully exciting. The drainage is usually well attended to, the cesspool system being preferred to sewers; so much alarm is caused by occasional cases of fever, that the chief resorts may be trusted to show themselves careful in this respect.

The Riviera season begins in October, but then the country is looking its worst after the long summer drought; while autumn rains, or even floods, are likely to make it dismal, and the first chills, that chase away the mosquitoes, may be keenly felt by those who expected perpetual summer. Sport acts as a counter attraction at home to keep away pleasure-seekers; invalids are inclined to put off their long journey, often too late; and it is rather for the second half of the winter that these towns fill with guests, many of whom have to remain here till the hopes of northern spring tempt them homewards, wisely breaking the change perhaps at some of the half-way houses we have suggested in our articles on Alpine resorts. February is commonly the Riviera's best month. March again is apt to be windy and unsettled. In May it begins to glow too hotly under its summer sun, and by this time is deserted by foreigners, the hotel-keepers, waiters, and doctors mostly going off to carry on their business at watering-places of a different kind.

As to accommodations, the class of our countrymen most at home on the Riviera chiefly affect the large and well-managed hotels to be found at all its flourishing resorts, the charges of which of course vary, but on the whole are not unreasonably high ; perhaps 10 or 12 francs a day might be taken as average terms for board. Wine is usually an extra at the hotels frequented by English visitors; firewood and baths make other expensive items. Boarding terms will nearly always be given for a sojourn. More economical pensions are also to be found, which we will endeavor to point out to our readers ; but it should be said that the homely boarding-houses of German and Swiss resorts are not so frequent on the French Riviera as the hotel-pension, which is rather a quiet hotel, open to passers-by for a night or two. The system of living in lodgings, as we understand it, is almost unknown ; but those who are not altogether helpless in the ways of the country may hire an apartment for the season and cater for themselves, or take their meals at a *table d'hôte*, while villas abound everywhere to be let to those who can afford them ; the best of course are likely to be engaged early in the season. At places much frequented by English people a system of letting furnished flats is coming into vogue The cost of living, unless in the matter of fruit and vegetables, will be about as high as in England.

At every place of note are found English chaplains, doctors, nurses, chemists, and other tradesmen ; the visitor may even be able to make a choice between High and Low Church services. The fees of English doctors are not small, as might be expected ; a common charge is a napoleon or a sovereign for the first consultation, and 10 francs for succeeding ones ; but some of the most fashionable physicians at Nice or Cannes look to be paid at a higher rate.

This coast is divided by Genoa into the Western and Eastern Riviera, the latter of which, being colder and damper, is less sought by invalids and foreign idlers Another division is into French and Italian territory, with Mentone as the frontier station. The Italian resorts are naturally more congenial to Germans in the present state of political animosities. The French ones are the favorites with English and Americans, and generally much more important.

THE PYGMIES OF THE CONGO.

EVER since Du Chaillu claimed to have discovered, in a negro tribe, the Obongos, of western equatorial Africa, the pygmies of Herodotus, the subject of dwarf races has attracted the attention of anthropologists. Fanciful description and illustration has unfortunately thrown considerable doubt upon the actuality of such people, and even to-day there are many who prefer to believe that their reported existence is merely a traveler's tale, or a tradition of history no longer worthy of credence. Whatever skepticism may have been originally felt regarding Du Chaillu's narrative, the researches of Schweinfurth and Stanley have placed beyond doubt the fact that dwarf races do inhabit —it is true only in lingering numbers—the fastnesses of inner Africa, and M. Dybowski has quite recently reidentified the people to which Du Chaillu first called attention. In an article contributed to *La Nature* this investigator describes in considerable detail the pygmies (Obongos) of the western Congo region, several of whom were employed in the services of his expedition as porters and hunters. We quote a portion of his description :

" One of my first cares was to secure the native huntsman who supplied the post with an abundance of game of all kinds. What was my surprise when he was brought into my presence to find a little man, who at first sight appeared to be only an infant of about twelve years. My interpretation was, however, soon corrected; the little hunter was a man of some 25 or 30 years, as all the external characters plainly indicated. He appeared backward and timid, almost cowardly, his physiognomy betraying a condition of extreme reserve. It was, indeed, difficult to conceive that this man, who was laughed at and ridiculed by my other servants, was a creature of energy and a fearless hunter, for whom no animal was too bold or ferocious. To my inquiry as to his nativity, he replied that he was a member of the tribe of the Obongo or Okoa, who had gradually been driven from their possessions by more powerful tribes, and in diminished numbers been forced into a condition of vassalage. I examined with much care this first specimen of west-coast pygmy, making various measurements, and also subjecting him to the ordeal of photographic interpretation. He measured just 1.38 metre (4 feet 6 inches) in height. What specially distinguished him from the other negroes, apart from the matter of stature, was the color of the skin—a light bronze, but little darker than the color of the skin of many mulattoes. The short and rather meagre hair, frizzled but yet not united in the form of *grains de poivre*, was equally light, of a brownish red, something like the hair of blacks that is discolored through a lime preparation. This is, however, the natural color with the Obongos. The greater part of the body is largely hairy, the arms and chest being in a measure protected by a short almost straight and nearly blonde, down.

The cranial structure is an interesting one; the head is globular, with but little leaning to prognathism. The lips are of only moderate thickness, and the nose descends almost straight to the line of the feebly expanded nostrils. But what particularly strikes the observer is the light coloring of the visual organs and their belongings. Eyebrows and eyelashes are both fair, and the eyes themselves have nothing of that intensity which distinguishes the eyes of most negroes. Such was this little man, singular in almost every aspect, who to my other attendants represented an inferior race of people merely because he did not resemble them.

Two other members of the same tribe were measured by M. Dybowski, and were found to be respectively 1.41 and 1.42 metres (or 4 feet 7¼ and 4 feet 7¾ inches) in height. In all essential characters they agreed with the hunter just described, and like him combined with muscular strength a remarkable amount of endurance. The tribe is seemingly on the verge of disappearance, its representatives appearing singly or in scattered fragments; no established communities were anywhere met with. They are manifestly suffering the fate of the Akkas of Schweinfurth.

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It is said that Mr. Frank H. Cushing, the many-years' student of the Pueblos, has material to carry back the tribal history of those people 700 years before the Spanish invasion.

AMONG THE TIBETANS.*

A WORK on one of the least-known regions of the earth's surface is always acceptable, and it comes doubly welcome when it emanates from a writer of recognized ability and cold integrity. Mrs. Bishop won her spurs as a traveler and observer years ago, and through her writings on the Sandwich Islands and Japan has made herself deservedly popular. Fluent and graceful in diction and accurate in statement she has made for her writings an enviable position, and even if they are not profound in their learning or rich in new facts, they are yet sufficiently important to have secured for their author fellowship in the Royal Geographical Society of London. With a few other "select" women she represents the female bench of this august body of explorers and friends of exploration, who only recently drew around themselves the cordon of disqualification to further membership of womankind.

Mrs. Bishop's latest work, "Among the Tibetans," is a record mainly of personal experiences in a journey from Srinagar (or what used to be Serinuggur), in the Vale of Kashmir, to Leh, the capital of Ladakh or Lesser Tibet, over the great caravan route which conducts into the heart of Asia. This journey is ordinarily one of only nineteen marches, and taking the character of the roadway—oftentimes the merest rudiment of a mountain trail, clinging to the side of projecting rock-ledges, or carried over bridges of the frailest construction—into consideration, can necessarily represent only a small explorable area. From its limited space, however, Mrs. Bishop has extracted much that is interesting, and her picture of travel is more vivid and realistic than has been presented by most of her predecessors. The heart of Asia loses much of its terrors from her narrative, and we are transported *facilement* to mountain heights of 15,000–18,000 feet, bathed in the heat of a blazing sun, over glaciers and through snow-fields on a cantering horse, and into the throbbing swirl of mountain torrents, a mile or more in width. The following description of the region approaching Leh, above the crest of the Himalayas, compactly states the character of the country traveled over: "The remaining marches were alongside of the tremendous granite ranges which divide the Indus from its great tributary, the Shayok. Colossal scenery, des-

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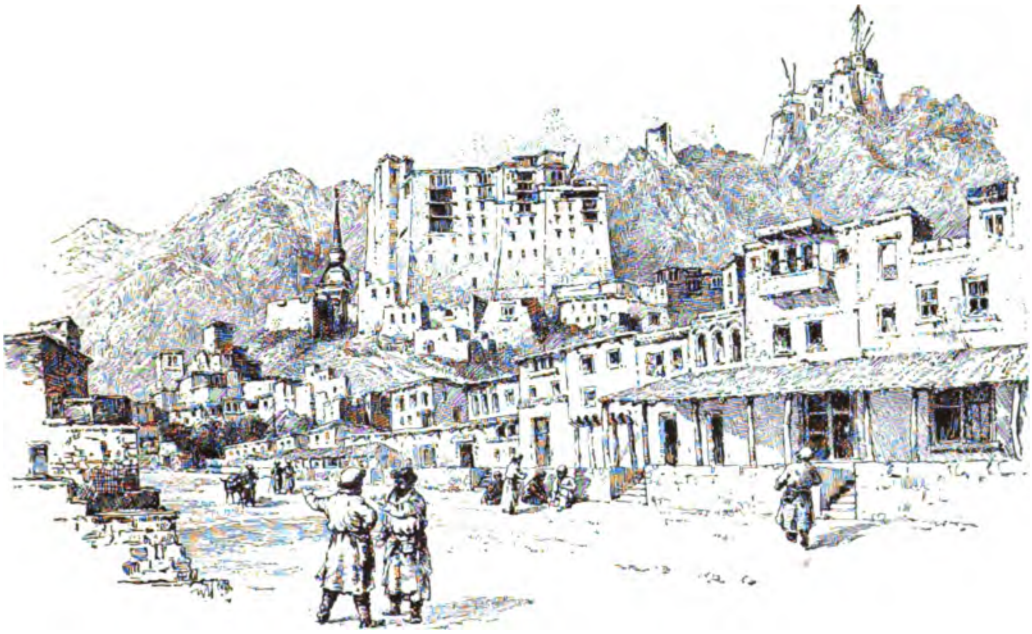
* By Isabella Bird Bishop, F. R. G. S. New York: Fleming H. Revell Co., 1894.

POPOCATEPETL.

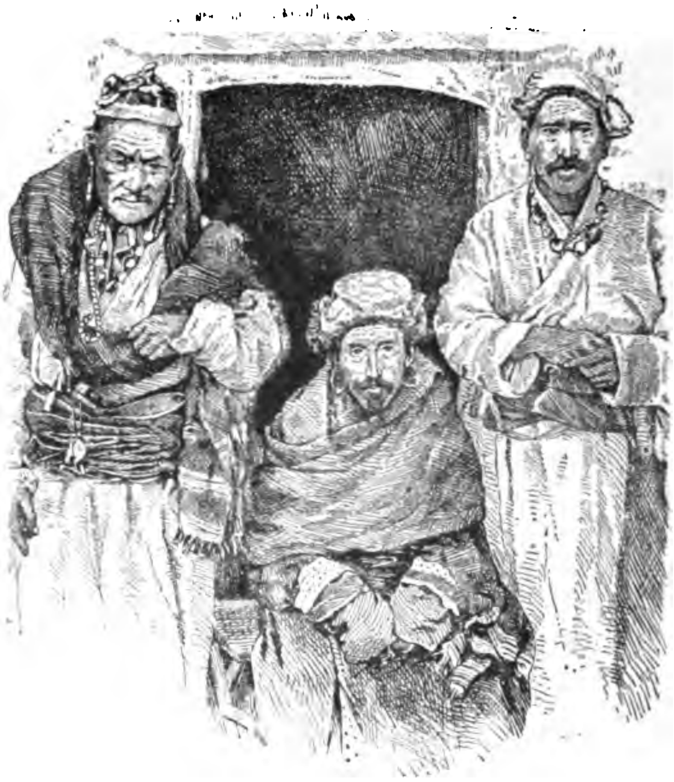
perate aridity, tremendous solar heat, and an atmosphere highly rarefied and of nearly intolerable dryness, were the chief characteristics. At these Tibetan altitudes, where the valleys exceed 11,000 feet, the sun's rays are even more powerful than on the 'burning plains of India.' The day wind, rising at 9 A. M., and only falling near sunset, blows with great heat and force. The solar heat at noon was from 120° to 130°, and at night the mercury frequently fell below the freezing point. I did not suffer from the climate, but in the case of most Europeans the air passages become irritated, the skin cracks, and after a time the action of the heart is affected. The hair when released stands out from the head, leather shrivels and splits, horn combs break to pieces, food dries up, rapid evaporation renders water-color sketching nearly impossible, and tea made with water from fifteen to twenty below the boiling-point of 212°, is flavorless and flat."



LEH
Capital of Lesser Tibet.

Of the capital itself Mrs. Bishop draws a no very cheering picture : "The situation of Leh is a grand one, the great Kailas range, with its glaciers and snow-fields, rising just behind it to the north, its passes alone reaching an altitude of nearly 18,000 feet; while to the south, across a gravelly descent and the Indus Valley, rise great red ranges dominated by snow-peaks exceeding 21,000 feet in altitude. The centre of Leh is a wide bazaar, where much polo is played in the afternoons; and above this the irregular, flat-roofed, many-balconied houses of the town cluster round the palace, and a gigantic *chodten* alongside it. The rugged crest of the rock on a spur of which the palace stands is crowned by the fantastic buildings of an ancient *gonpo* [lamaserai]. Beyond the crops and plantations which surround the town lies a flaming desert of gravel or rock. The architectural features of Leh, except of the palace, are mean. A new mosque glaring with vulgar color, a treasury and court of justice, the wazir's bungalow, a Moslem cemetery, and Buddhist cremation grounds, in which each family has its separate burning place, are all that is noteworthy. The narrow alleys, which would be abominably dirty if dirt were possible in a climate of such intense dryness, house a very mixed population, in which the Moslem element is always increasing, partly owing to the renewal of that proselytizing energy which is making itself felt throughout Asia, and partly to the marriages of Moslem traders with Ladaki women, who embrace the faith of their husbands and bring up their families in the same."

Of the great market our author writes as follows: "Great caravans *en route* for Khotan, Yarkand and even Chinese Tibet arrived daily from Kashmir, the Punjab, and Afghanistan, and stacked their bales of goods in the *place;* the Lhassa traders opened shops in which the specialties were brick tea and instruments of worship; merchants from Amritsar, Cabul, Bokhara and Yarkand, stately in costume and gait, thronged the bazaar and opened bales of costly goods in tantalizing fashion; mules, asses, horses and yaks kicked, squealed, and bellowed; the dissonance of bargaining tongues rose high; there were mendicant monks, Indian fakirs, Moslem dervishes, Mecca pilgrims, itinerant musicians, and Buddhist ballad howlers; bold-faced women with creels on their backs brought in lucerne; Ladakis, Baltis, and Lahulis tended the beasts, and the wazir's *jemadar* and gay *spahis* moved about among the throngs. In the midst of this picturesque confusion, the short, square-built Lhassa traders, who face the blazing sun in heavy winter clothing, exchange their expensive tea for Nubra and Baltistan dried apricots; Kashmir saffron and rich stuffs from India; and merchants from Yarkand, on big Turkestan horses, offer hemp, which is smoked as opium, and Russian trifles and dress goods, under cloudless skies. With the huge Kailas range as a background, this great rendezvous of Central Asian traffic has a great fascination, even though moral shadows of the darkest kind abound."



TIBETAN HEADMEN (GOPAS).

These extracts suffice to indicate the character of Mrs. Bishop's book, but it would hardly be doing the author justice to omit all reference to her "personal" descriptions, the most perfect rendering of which is to be found in the following exquisite characterization of her equine companion: "Gyalpo, my horse, must not be forgotten—indeed, he cannot be, for he left the marks of his heels or teeth on every one. He was a beautiful creature, Badakshani-bred, of Arab blood, a silver-grey, as light as a greyhound, and as strong as a cart-horse. He was higher in the scale of intellect than any horse of my acquaintance. His cleverness at times suggested reasoning power, and his mischievousness a sense of humor. He walked five miles an hour, jumped like a deer, climbed like a yak, was strong and steady in perilous fords, tireless, hardy, hungry, frolicked along ledges of precipices and over crevassed glaciers, was absolutely fearless, and his slender legs and the use he made of them were the marvel of all. He was an enigma to the end. He was quite untamable, rejected all dainties with indignation, swung his heels into people's faces when they went near him, ran at them with his teeth, seized unwary passers-by by their *kamar bands*, and shook them as a dog shakes a rat, would let no one go near him but Mando, for whom he formed at first sight a most singular attachment, but kicked and struck with his forefeet, his eyes all the time dancing with fun, so that one could never decide whether his ceaseless pranks were play or vice. He was always tethered in front of my tent with a rope twenty feet long, which left him practically free ; he was as good as a watchdog, and his antics and enigmatical savagery were the life and terror of the camp. I was never weary of watching him, the curves of his form were so exquisite, his movements so lithe and rapid, his small head and restless little ears so full of life and expression, the variations in his manner so frequent, one moment savagely attacking some unwary stranger with a scream of rage, the next laying his lovely head against Mando's cheek with a soft cooing sound and a childlike gentleness."

LAHUL VALLEY

British Tibet (Elevation 10,000 feet).

THE DOMESTICATION OF THE ZEBRA.

M. Mégnin contributes to *La Nature* an interesting article on the results that have been obtained at the Jardin d'Acclimatation, of Paris, in the training of zebras, animals that are commonly considered to be untamable, and are so stated to be in many works on natural history. Yet it is well known that so far back as 1874 successful results in domestication and training were achieved at this same garden, and we have the authority of the late Dr. Brehm, than whom there has been no more careful collector of data in zoölogy, for the statement that in the Cape region of South Africa the quagga (which is, in fact, only a form of zebra) is frequently to be seen harnessed in with the horse as an animal of draught.

Of the three or four recognized species of zebra—zebra, dhaw. quagga, and Grévy's zebra—all of which are inhabitants of the east and south of Africa, the zebra proper (or the fully striped animal) appears to be the least tractable, and shows himself to be the most unyielding to the efforts that have from time to time been made to bring about his subjection. And, in truth, these efforts require an almost endless store of patience, and a continuance by degrees that is apt to be severely trying to even the most resigned of animal trainers. The zebra may yield to gentle persuasion, but is obstinate to rigorous methods, and often becomes fiercely vicious when forced by coercive acts or even threats. The experiments at the Jardin d'Acclimatation were conducted on the line of leniency and affection, much in the manner that is adopted to break obstreperous horses. They were first made to know the halter, after which they were accustomed to a fixed position in the stalls, side by side with animals of their own kind ; these were from time to time interchanged with horses, from which they gradually acquired certain traits that were required of them. This simple treatment, to which was joined the freedom of an enclosed roaming-ground, was continued through five months, and only in the sixth month was the first effort at harnessing permitted. Two supposedly-gentle females, "Manette" and "Marianne," were introduced successively to the saddle, the collar, and the bridle, and, finally, to the full equipment that was necessary to draw a vehicle. With some difficulty the bit was introduced into their mouths, and then they were led out into a park promenade—for the first time singly, then side by side. This done, it was a comparatively easy matter to attach the cart, and then, practically, the work was accomplished. It was at first feared that the animals would not draw regularly or in unison, but after a few trials they showed themselves nearly as manageable as horses. The tour of the Jardin was followed by a promenade through the Bois de Boulogne, down the Avenue de Neuilly, and, finally, through the crowded streets of the capital. After three months of harnessing they were put to trot over the entire line between the Jardin and the Place de la Concorde, and shortly afterwards they were regularly harnessed to daily service in the interests of the garden, drawing heavy loads, and performing the work that had hitherto been performed by horses.

Harnessed zebras have, on a few occasions, been seen in this country, but they are still a rare occurrence, and even the great beauty of the outfit hardly compensates for the effort that is required to obtain their service. Still, there can be little doubt that before very long fashion's wealth will introduce these lovely animals to recognized positions in the stable.

AMERICAN CAVE-DWELLERS.*

CARL LUMHOLTZ.

MY explorations in northern Mexico extended over a period of three years. It was in September, 1890, that I entered, with eight scientists and assistants, the upper portion of the Sierra Madre, the Mexican prolongation of the Rocky Mountains.

In this first expedition we made excavations of the ruins near Casas Grandes, in Chihuahua. Several months were spent in the United States in 1891, and I then resumed operations in Mexico, following the Sierra from Casas Grandes to the border of the State of Durango, until the summer of 1893, and pursuing the work for the greater part of the last fourteen months wholly without assistance.

My first care on returning to the United States was to visit the Chicago Exposition, where I had occasion to admire the superb reproductions of the Cliff Dwellings, which attracted and interested so many of the visitors to that great display ; but I have been surprised to find, in various parts of the country, an accepted belief in the existence of cliff-dwellers at the present day.

This belief is in some measure due to inattention and to a confusion of ideas, though much of it must be referred to the reckless utterances of a traveler, lately deceased, to whose statements the anthropologists of America have for a long time ceased to attach any weight.

Cave-dwellers are found among the following tribes, counting from the north : The Southern Pimas, the Tarahumaris (as well as the allied Varogios), and the Tepehuanes. All these tribes inhabit the State of Chihuahua, and are more or less mountaineers, living almost entirely in the great

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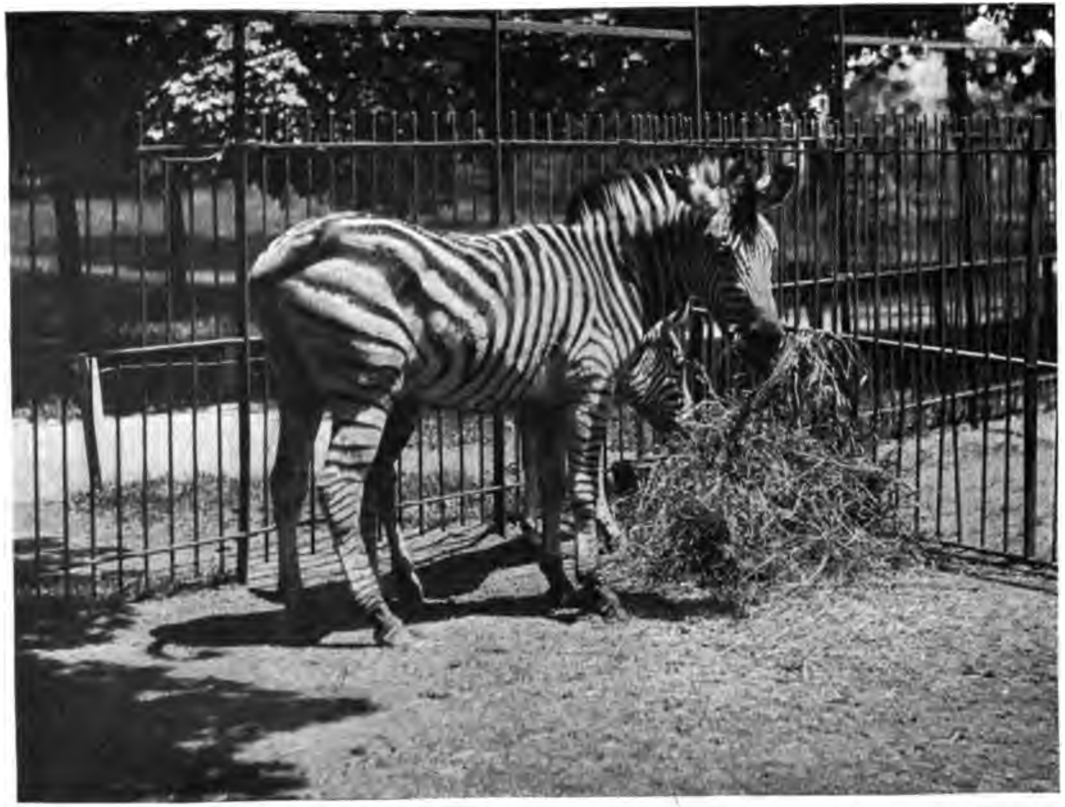
* From an address delivered before the American Geographical Society.



BURCHELL'S ZEBRA.

Sierra Madre range. Of these people the Tarahumaris are most attached to caves, the Tepehuanes the least. All are linguistically related, and belong to the Pima, or as Dr. Brinton terms it, the Uto-Aztec stock. In some of their customs and manners they also greatly resemble each other, while in others, as well as in character, they are strikingly different. Very little that may be called accurate was known of these tribes. The Tarahumaris, the most primitive of them and the least affected by Mexican civilization, are the most interesting, and I shall confine myself in the following remarks almost exclusively to this ancient people, who may justly be termed the living cave-dwellers of the American continent. Ancient remains are nowhere numerous in northern Mexico, and as soon as one enters the regions inhabited by Indians they almost disappear. Thus it is a rare thing to meet with old cave-houses ; those found are of grit, always very simple and wretchedly small. The Indians of to-day attribute the majority of them to a mysterious people, the Cocoyomes, who were small of stature, did not till the soil, but ate each other and the Tarahumaris, or green herbs and had other characteristics of the brute. While I have found corpses buried inside some of the houses said to have been built by the Tubares, a tribe now nearly extinct, the dead are commonly found in special caves quite numerous throughout the Sierra, and frequently disturbed by roaming Mexican treasure-seekers, who leave few caves untouched.

The natives rightly count only three seasons, namely, the dry, the rainy, and the winter. Snowfalls in winter are by no means unknown on the high land. The climate of the Sierra, although not so very pleasant on account of the winds, is extremely salubrious, the heat never becoming enervating, as it does not exceed 90°, while the nights are deliciously cool. Lung diseases are unknown, and the sanitary condition of the Sierra is excellent.

Down in the barrancas, where the heat becomes at times excessive, the climate is very far from salubrious, and I have seen even Indians ill with fever and ague, contracted generally in the rainy season. Between these two extremes, I have never experienced a more delightful climate than upon the slopes of the Sierra down towards the warm country. The air is pure and the temperature remarkably even. There is a story to the effect that a Mexican woman who settled in that part of the country broke her thermometer because the mercury never seemed to move, and she thought that it must be out of order.

The climate of the country as a whole is remarkably dry, and for the last two years there has been an unusual drought. As Indian corn will grow with a moderate amount of rain, it generally does well both on the high land and in the barrancas.

This country, thus comprising the high lands, the barrancas, and the wild slopes toward the west, is inhabited by the Tarahumaris, of whom the greater part live in the pine-clad plateaux. These people, who formerly had a much larger territory are found between the latitudes of 25½° and 29°, from the pueblo of Temosachic south toward the border of Durango. Mexican civilization has long ago encroached upon their territory, and, even in the Sierra, Mexican ranches have absorbed the best part of the soil. However, in the central part these Indians still have absolute dominion, and no white man dares to interfere with the natives' right to the soil.

The tribe is little affected by civilization. Firearms are hardly known and they still use bows and arrows. Nominally Christians, they cling to their old beliefs, and are lapsing into heathenism. Some of them meet at the church on Sundays, to hear prayers, and on feast-days they mingle their heathen dances and sacrifices with semi-Christian ceremonial. Their churches are in ruins, and there is only one padre for the whole Tarahumari country.

A few of them speak a little Spanish, but the majority do not know that language ; and in the most remote parts of the barrancas are found several thousand genuine pagans (called *Gentiles* by the Mexicans), who do not associate with the so-called Christians and who do not understand any other language than their own.

I experienced at first considerable difficulty in associating with these Indians, who are extremely distrustful of strangers. Frightened by some skulls that I had excavated, they took it into their heads that I was a cannibal, and lived entirely upon women, children and green corn. They used to disappear wherever I traveled, so that at one time my task appeared almost hopeless. Fortunately, when I began my investigations alone, I had the good luck to start out with rain. The Indians had for months and months been praying and dancing for rain, which now, for some weeks, seemed to follow me. They soon associated my presence with the rain, and from that time on I was of good omen to them. They were now pleased to pose before the terrible camera, which, in their eyes, had become so powerful a rain-maker.

These people live in many different kinds of habitations, the variety of which is very remarkable. The majority use a kind of house consisting of a frame-work of four poles, on which rests a roof made of a double layer of split pine logs Towards this frame-work lean the slanting walls of loose boards.

There are also regular log-houses, with doors, but no door-jambs. Where the climate is genial are found mere straw houses. Sometimes these houses consist simply of a roof of boards or thatch, or even earth, resting on four poles, or a lean-to without walls. In the pueblos the Tarahumaris live in houses made of stones and abobe. But in this country of weathered porphyry and interstratified sandstone, where natural caves and shelters are numerous, the Tarahumaris also make a free use of such habitations, to such an extent that they may be termed the living cave-dwellers of the American continent.

Some of them are permanent cave-dwellers; for there are barrancas and arroyos where cave-dwellers may always be found; but most of the Tarahumaris are only temporarily so. The so-called Christian Tarahumaris on the high land live during the winter in the villages or pueblos, while they spend the rest of the year at their ranches in the mountains, living in wooden or stone hovels. Many of them do not come to the villages at all, as the missionaries taught them to do, but go into caves in the winter, *se encuevan*, as the Mexicans say. Thus in the neighborhood of Nararachic many Christians are cave-dwellers during the winter, but in summer most of them leave the caves for fear of the scorpions, tarantulas, "vinagrones" (*telyphorus*) and other pests which in the warm weather frequent the rocks. Within the memory of man, many caves have been abandoned for good, owing to the encroachment of Mexicans upon the land of the Tarahumaris, the latter disliking the neighborhood of white men. As regards the pagans (Gentiles), who still in considerable numbers are found in the remote barrancas very difficult of access, they all love caves, but their mode of life is shifting. They plant corn high upon the crests of the barrancas in March, and when the rain begins in June and July they descend into the cañon to plant corn there. Subsequently they harvest, first upon the high ridges, then in the barrancas, where they retire for the winter to enjoy the warm temperature, living on the high land in wooden shelters, in the barrancas in caves, or under a big stone or a tree, as the case may be.

The greatest number of inhabited caves is found in the western part of the Sierra toward Sinaloa It is seldom indeed that the caves are improved. I have, in a few cases, seen partitions of stone and adobe in them, but these never reach the top of the cave. The most common improvement is a loose stone wall in front of the cave, as high as a man's breast, as a shelter against the wind. The caves are rarely found in inaccessible places, like some in the United States. If they are difficult of access, they are made accessible by one or two wooden ladders, or rather notched trunks of trees. The caves are always found apart, at a distance of from 100 yards to a mile or more. I heard of one arroyo where six can be seen at the same time, distant only from thirty to fifty yards apart; but this is a rare case. It is also rare to find more than one family living in the same cave; if so, the people are always near relatives.

When the caves are permanently inhabited, they are fitted up as are their houses, with the same utensils, the grinding-stone, baskets and jars. The fire is in the middle of the cave, and the floor is often cemented with adobe.

The storehouses, so necessary to the household life of the Tarahumaris for storing corn and clothing, are never missing in the caves. They are built of stone and adobe along the inner walls, and serve as big closets. The largest inhabited cave I have seen was nearly 100 feet in width, and from 20 to 40 feet in depth. If the caves are very deep, the Indians live near the mouth. Never do they excavate caves or holes for habitations. These storehouses are quite an institution among the Tarahumaris, and are besides found everywhere in remote places, perched generally on high rocks or on boulders. Very often caves in places difficult of access are walled in and used as storehouses

Although the Tarahumari is not nomadic, his life is shifting. He removes his domestic animals according to season, and plants corn in different localities, moving accordingly. On the high lands the Tarahumaris are certainly more permanent, and here the best wooden houses are found. Here they may even be found living in ranches of from five to six families, but even here on the high land a Tarahumari never lives all his life in the same house; if any one dies, the house is pulled down and removed. A peculiar custom among the Tarahumaris is that at night the father and mother will leave the house or cave to be taken care of by the children, while they go to sleep under a tree, in the shelter of the storehouse, or in some other cave, according to convenience

The fact that people live in caves is in itself extremely interesting, but this alone does not prove any connection between them and the ancient cliff-dwellers, who lived in common, while the cave-dwellers of to-day are unsocial and isolate themselves. They are the old cave-dwellers who probably lived in caves long before the people of the southwest, pressed by enemies, made their remarkable homes in the cliffs and caves. To-day they still preserve ancient practices and customs, which other Indians have lost either wholly or in part.

Although the Tarahumari is very intelligent, he is backward in the arts and industries. His pottery is exceedingly crude, as compared with the work found in the old cliff-dwellings, and its decoration is infantile as contrasted with the cliff-dwellers' work. Moreover, he is utterly devoid of the architectural gift which resulted in the remarkable rock structures of the early cliff-dwellers. These people, so far as concerns their cave-dwelling habits, cannot be ranked above troglodytes.

The Tarahumari of to-day is of a medium size and a dark-brown color. The people of the barrancas are smaller than those of the high lands. The Tarahumari is more muscular than most of our North American Indians. Their cheek-bones are prominent and their expression is heavy. The woman is smaller than the man, but generally just as strong, and when angered by jealousy is often able to beat her man. They are rapid walkers, gliding smoothly along with quick steps, with the body very slightly bent forward, and without any swaying to and fro.

Both men and women wear long, flowing, straight black hair, in rare cases wavy, which they, like the southern Pimas, comb with pine-cones. It is held together with a woolen headband made for the purpose, or with a narrow plaited band of palm-leaf. Their teeth are exceptionally fine, and the canine teeth are not readily distinguished from the incisors. Beards are very rare, and if one appears, the Indians pull it out with great care. Their devil is always represented with a beard, and they call the Mexicans "the bearded ones."

The men wear a breech-cloth held up with a girdle, the women a petticoat and girdle, while in cold weather both sexes have tunics and blankets. The women are clever in weaving blankets, girdles and clothing on primitive looms lying on the ground. In contrast with most other savage races, these Indians are not fond of ornaments. The women wear hanging ear ornaments of mother-of-pearl and necklaces of grass-seed. The men may chalk ornamental designs on their faces and legs at the foot races, but few of them wear necklaces. A singular fact is that mirrors have no attraction either for the men or women; they do not want to look at themselves.

The Tarahumaris cultivate corn, beans, potatoes, and also in the barrancas tobacco and chile (Spanish pepper). Their chief dish is what the Mexicans also use to a great extent, and call pinole—toasted corn, ground to a flour on a stone, and mixed with cold water. It is cooling and nourishing, but rather indigestible. As a luxury corn-cakes (tortillas) are eaten. From the harvest, which is in September and October, until February, the Tarahumari lives well, but starves from that time until the next harvest, subsisting chiefly upon herbs and the flesh of small animals, particularly squirrels and rats. A great many seeds, roots and the young shoots of the ash tree serve him for food.

In the dry season the Indian subsists almost wholly at times upon the baked heart of the maguey. This sweet stuff, which is also eaten with pinole, is to me frightfully indigestible. The Tarahumari likes to have meat every day, although he cannot always get it He rarely or never kills any of his domestic animals for food, but goes hunting with his bow and arrow, and is also extremely ingenious in trapping animals. In order to get one squirrel, the Indians may cut down as many as ten pine trees, a whole day's work. They poison the waters of the rivers by means of the bark of certain trees, and also by herbs, stupefying the fish, but not making them uneatable. In the barrancas of the River Fuerte large parties of them may be seen fishing at night in this manner, observing several interesting ceremonies. Later on in the summer, in places where the river is deep, they may be seen fishing with nets made by fastening some sixteen blankets together lengthwise with wooden splinters.

They are abstemious when at home, eating only twice a day ; but when serving the Mexicans, they gorge themselves to illness. They generally rise at night, however, to eat and to play on the home-made violin, of the music of which they are very fond.

They show, even when in a starving condition, a remarkable endurance. An Indian has been known to carry a letter from Guazapares to Chihuahua and back again in five days, the distance being, as reported, more than 100 miles a day. In some parts, where the Tarahumaris serve the Mexicans, they are used to run in the wild horses, driving them into the corral. They will pursue deer in the snow, or with dogs in the rain, for days and days, until at last the animal is cornered and shot with arrows, or falls an easy prey from sheer exhaustion, its hoofs dropping off.

Their senses are keen, but in this respect they are not much superior to well endowed civilized men. They certainly do not feel pain in the same degree that we do.

The Tarahumaris are very fond of heat, and may often be seen lying on their backs or stomachs in the sun. Heat never seems to trouble them. I have seen young babies sleeping with uncovered heads on the backs of their mothers, exposed to the fierce heat of the summer sun. In the pine regions, where they live longer than in the barrancas, it is not infrequent to meet men and women who are at least 100 years old. Long life is what they pray for. Old people are many ; their hair is gray, but they are seldom bald.

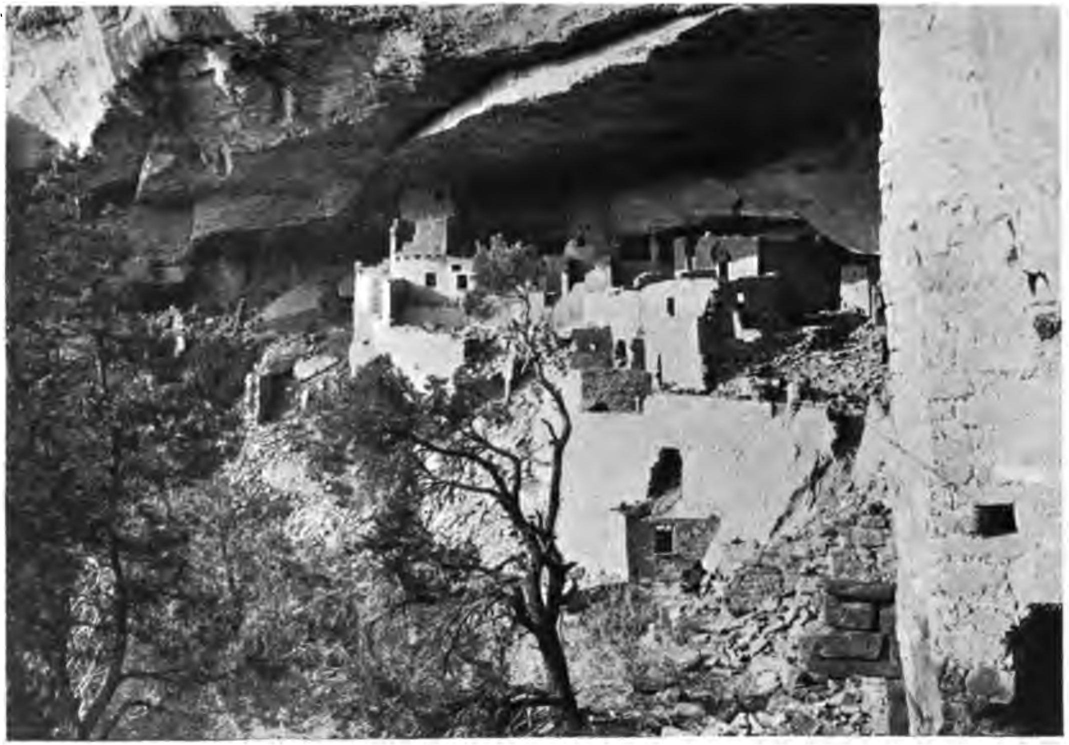
The attraction of these people is their wonderful health, which may be looked upon as a matter of course in that delightful climate of the high lands. However, they are subject to pleurisy (*dolor de costado*), which generally proves fatal.

The Tarahumari woman is a good mother and takes great care of her children, of whom she generally has from six to eight, or even more, and she nurses them until they are three years old. A boy or girl is never punished, although often scolded. If a boy misbehaves, the father may reproach him at a feast or before one of his friends, and the friend may also talk to the culprit. The children are very independent, and if angry the boy may strike his father or mother.

The woman bears her child alone, and the husband makes no inquiry about the baby. When three days are over, the mother bathes herself, but the child is not washed until one year old. While she is bathing she leaves the little one naked in the sun, in order that he (the sun father) may recognize his newly-born son ; and the baby is left thus, in spite of its wails, for about an hour. Then the shaman comes to "cure" it, so that it may become strong and live a long life, carrying it over smoke of the mountain cedar, three times toward each cardinal point and also three times backward ; with a firebrand he makes three crosses on the child's forehead if it is a boy, and four if it is a girl.

As a rule, the Tarahumari is not a thief, but if he thinks himself quite unobserved and safe, and the temptation is very strong, nearly every one will steal. He never cheats, and is a pleasant fellow to deal with so far as honesty goes. He is averse, however, to selling anything, and considers it a favor. In fact, when you succeed in making a bargain with an Indian, the mere fact establishes a species of foster brotherhood (when you and he call each other nanagua), and this facilitates later transactions. Time for consideration is thought absolutely necessary by the Indian. To buy a sheep requires at least two hours. In all bargains he always consults his wife, and even his children ; and if any of them, even the youngest, objects, nothing can be done. To conclude a bargain about an ox may require three days. The almighty dollar has no power with most of them. The Indian has no need of money or of aught that money can buy for him, and he is swayed more by persuasion than by silver. He is rich when he has three or four cattle, with some sheep and goats. Silver Mexican dollars from outsiders are accepted in exchange for corn and other products, but among themselves a system of barter prevails. In most cases cotton cloth is preferred to dollars.

The Tarahumari is heavy and phlegmatic. His face is devoid of expression, and it seems at first hopeless to the traveler to get any information out of him. He is timid, and tries to run away at the sight of strangers, leaving his house or cave and its contents behind him. It is hopeless to follow, because the country is extremely rough and they hide so effectually. When I travel I therefore always send an Indian to prepare the way for my arrival. The women and children are bashful in the extreme, which may be due to the sharp criticism and gossip common among them. Their chief trait is distrustfulness, but it may be overcome, although they seldom become absolutely trustworthy friends. They have no depth of character. Gratitude is fairly



A RELIC OF THE CLIFF-DWELLERS.—CLIFF PALACE, COLO.

developed. They are cowards when few in number, but if there are many, they know no fear. They are the only Indians who have held their own against the Apaches. They are rather affectionate, but it is seldom that they show affection in public, unless when drunk. The Tarahumari is a polite personage for a barbarian, and has a word, "re-cò," equivalent to "please," which he uses frequently. Although they will give food to a stranger, if properly approached, they are not particularly hospitable, and there is no room in a Tarahumari house for a guest. If one Tarahumari visits another he never thinks of entering the house, but takes a seat on the ground, forty or fifty yards away. Nothing so angers a Tarahumari as the appearance in his house of a man unannounced. He might even kill the intruder. Only the dogs, they say, enter the house uninvited It is not even polite to look at another man's house. So, if you want to get on well with an Indian, it is necessary to sit at least a quarter of an hour near his hut, gazing into vacancy. Should the host be absent, the native visitor may sit near by for hours, and finally go away.

OUR ILLUSTRATIONS.

POPOCATEPETL, THE GREAT "SMOKY MOUNTAIN."

OF the many volcanic summits of the globe few present a more graceful outline or more majestic appearance than the "Smoky Mountain" of Mexico. Placed on the edge of the great central plateau, with one side looking to the republic's capital and the other descending deep into the tropical lowlands, it presents the double aspect of a mountain of 10,000 and of 17,000 feet elevation. Seen from the basal plains, it sweeps up in one grand curve to nearly its full height—a colossus of three and a quarter miles elevation, white with everlasting frost on its summit, and bathed in the green of the palm, banana, orange and mango at its base. Evergreen oaks and pines encircle its middle height, and beyond them, before the ice is itself reached, follow the disintegrated rock-sands into which the lavas of eruption have been changed. Soft wreaths of sulphur vapor may at times be seen curling over the crest of the summit crater—gentle reminders that the days of activity are not yet necessarily over.

Our illustration of this famous mountain is taken from a position west of the small hamlet of Amecameca (or Ameca)—the Chamounix of America—the side from which the ascent of the volcano is generally undertaken. This is neither a difficult nor a dangerous task, although naturally one's capabilities in this direction will depend largely upon a healthy lung and heart action, combined with a good supply of mental determination. One or more ascents are probably made every year, and seemingly even women have tempted their strength in the direction of the summit. Horses can mount without much difficulty to an elevation of some 13,500 or 14,000 feet, and perhaps with a slow and determined effort they could be made to go still 2000 feet higher. The view from the summit is almost incomparably grand, reaching on a clear day over to the Gulf of Mexico—so, at least, it has been reported—and southwestward almost to the Pacific. On three sides it is unbroken except by the limitations of vision ; on the fourth (to the north) it looks over to a colossus of nearly its own height, the famous "White Woman," or Ixtaccihuatl.

The absolute elevation of Popocatepetl is approximately 17,520 feet, or about 700 feet less than that of the Peak of Orizaba, 100 miles distant. Although rising for full 3000 feet through the snow-plane, the snow covering is of inconsiderable development, rarely measuring more than 3–6 feet in thickness. No structure worthy of the name of glacier is found on the mountain. At the present time it is said that a syndicate of capitalists has been formed looking to the exploitation of the sulphur contained in the crater, and that a railway to the summit is in contemplation.

BELLAGIO, ON LAKE COMO.

Many of our readers are probably personally familiar with this villa-town of Lake Como, situated at the head of the promontory which divides the arms of this lake, and by many considered to be the most enchanting spot in the whole of Italy. The steep and crooked streets, stately mansions, and luxuriant gardens buried behind high stone walls, together with all the quaintness which distinguishes the "intermediate" Italian architecture and that which belongs to it, and above all the magnificent panoramas over lake and mountain which are spread out before every point of unimpeded elevation, are a lasting memory to the lover of nature, an enduring picture in the eye of the artist. Unfortunately, not all that is enjoyable can be freely enjoyed, and Bellagio, like many other Italian cities, has its deficiencies, its greatest being, perhaps, to sin against "the point of view." This is thus picturesquely stated by a recent writer: "The cramped situation is so much taken up by villas and their grounds, laid out before all the world took to traveling, that there is no great choice of adjacent walks beyond the steep stairs doing duty for streets and the enclosed roads leading from one hotel to another." A characteristic bit of Bellagio is represented in our illustration of the steep Via Terbelloni.

It is almost needless to refer to the special beauties of Lake Como. They have been sung in poetry and prose ever since the days of Virgil and Pliny, and the world has come to recognize them as standards of comparison for all other lake forms. And if there are many who would agree with Ruskin in yielding the palm for grandeur to the sister-lake Maggiore, Como would lose only through comparison with the grandest, and not in fact.

CLIFF PALACE.

As an appropriate supplement to the article on American Cave-Dwellers, we present an illustration of one of the ancient cliff dwellings of the southwestern United States, the deserted halls and crumbling walls of which read the silent history of a departed people. Across a wide area, from the Sierra Nevada on the west to Texas on the east, these ruins of a prehistoric race are scattered—here over a valley, there on a mountain face, and elsewhere in the dark recesses of the rock-bound cañons. Just who these people were remains a question yet to be solved, although not improbably the Zuñis, Moquis and allied tribes of Indians, who still to-day inhabit communistic towns built of stone and adobe, are in part their descendants.

The Cliff Palace of our illustration, which we owe to the photographic skill of Mr. Frederick H. Chapin, the author of the "Land of the Cliff Dwellers,"* is one of the largest structures of its kind, and fills a cave-like hollow in the overhanging ledges of Cliff Cañon, a tributary of the great Mancos Cañon of Colorado. The walls of the dead edifice are still in a fair state of preservation, and superficially suggest a palace or hall of a ruler—a suggestion that is not borne out by the more intimate study of the apartments. These clearly betray the communistic building—the home of the people. We borrow the following description from Mr. Chapin's fascinating work: "The space covered by the building is 425 feet long, 80 feet high in front and 80 feet deep in the centre. One hundred and twenty-four rooms have been traced out on the ground floor. So many walls have fallen that it is difficult to reconstruct the building in imagination; but the photographs show that there must have been several stories; thus a thousand persons may easily have lived within its confines. There are towers and circular rooms, square and rectangular enclosures, all with a seeming symmetry, though in some places the walls look as if they had been put up as additions in later periods. One of the towers is barrel-shaped; others are true cylinders. The diameter of one circular room, or *estufa*, is 16 feet and 6 inches; there are six piers in it, which are well plastered, and five recess-holes, which appear as if constructed for shelves. In several rooms are good fireplaces."

THE ZEBRA.

The illustration which we present to our readers is taken from an animal in the Zoölogical Gardens of Philadelphia. It is that known to naturalists as Burchell's zebra, *Equus* (*Hippotigris*) *Burchelli*—the true zebra, or common form of eastern and southern Africa.

THE SARGASSO SEA.

EVER since Humboldt called attention to the vast masses of sea-weed which in certain parts of the Atlantic float freely on the surface, and build up what he had assumed to be growing banks of high-sea vegetation, the subject of pelagic oceanic flora has been one of special interest to the naturalist; to the geographer the Sargasso or Sargassum Sea has constituted a little world of its own, unique by reason of its position, anomalous in the manner of its occurrence.

In a recent address upon the "Flora of the Sea," Prof. M Möbius corrects the erroneous notion that this bank is a growing garden, and points out many other misconceptions regarding it. He thus describes the formation:

An apparent exception to the rule that the high-sea flora is made up of minute organisms, adapted through their minuteness to the conditions of their life, is constituted by the group of the Sargasso algæ—tangles of olive-green or brown color, each individual "mass" being of about the size of the hand, with branches, leaves and fruit. The plant, a fucoid of the genus Sargassum, is known to botanists as *Sargassum natans* or *S. bacciferum*, the latter name being given to it from the presence on its surface of numerous vesicular bodies, of the size of a small berry, which were at one time considered to be the fruit of the plant. In reality they are merely air-filled floats, which sustain the stems in their floating condition. Strictly speaking, therefore, the Sargassum cannot be considered as a true member of the pelagic flora, inasmuch as the floating parts are merely the wreck of masses which grow along the oceanic littoral, and have been wrenched from their moorings by windstorms and waves. Their floats sustain them on the open surface, and permit them to travel over long journeys, whose destinies are determined by the courses of the oceanic currents; without these organs the plant sinks, as do nearly all the other forms of algæ. In this swimming condition the Sargassum may increase somewhat by continued growth, but no instance is known where new reproductive organs, so abundant in the attached form, have been developed on the stem—an evidence in itself that the plant is leading an abnormal existence. What is very remarkable, however, is that such large quantities can be continuously accumulating, presenting the aspect of meadows and banks. We find them in all seas, but most abundantly in the Atlantic, where they have long been known as the "weed-sea;" when Columbus's vessels passed through it, it was indeed feared that they would be captured by the dense tangle.

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*Published by the Appalachian Mountain Club of Boston.

The latest investigations into this remarkable occurrence, especially those made by the German "Plankton-Expedition," show that there is no such delimited fucus-bank as Humboldt had imagined, but merely areas or provinces where the sargassum is most abundant.

A calculation of the areas of general occurrence would seem to indicate that through the average year there is an increase in quantity toward the south and southwest, and that the maximum development lies south of the 35th parallel of latitude and west of the meridian of 35° W. (Ferro); seasonal influences modify the distribution considerably. What might be assumed to be the Sargasso Sea proper covers an area of some 4.4 million square metres, and is bounded by the Gulf Stream on the north, and by the Equatorial Current on the south. Indeed, it is the presence and action of these two currents which determine the distribution and localization of the banks.

The true home of the sargassum is the West Indian region, where a number of species of the plant, in their wrenched-off condition generally known under the one specific name of *Sargassum bacciferum*, are to be found. They are firmly attached to the rocks, and only the most violent storms can detach them; once freely floating, however, they can continue their independent voyage seemingly for years, or until the collapse of their supporting air-capsules. The southern border of the Gulf Stream guides them in their course, and carries them to the open sea; there they form a part of the oceanic flora, but, as before stated, they are strangers to the sea, and must be regarded there as merely decaying transients.

NOTES ON MOUNTAINS AND MOUNTAINEERING.

Expedition to Ruwenzori.—We extract the following from a communication by Mr. G. F. Scott Elliot, the organizer of an expedition to Stanley's great snow mountain (Mountain of the Moon?), bearing date from the foot of Ruwenzori, April 15th of this year: "As far as the plants are concerned, I find the same species of a very weedy character extending from Kavirondo to at least 5000 feet on Ruwenzori, and the majority extend from the coast. This does not apply, however, to the forests (of which I found none in Karagwe or Ankole) or the hills above 5000 feet. Since arriving here I have had constant attacks of fever, and been able to do nothing; but in a very short time I hope to get a camp established at a good height. Unfortunately, there is no European official here, and political affairs are not as they should be; Kabbarega's army also passed over this side of Ruwenzori and devoured most of the food; locusts have eaten a large portion of the remainder; lions and leopards have taken to eating men in the absence of sheep, and have already severely wounded two of my men, and things generally are anything but satisfactory. There is a good deal of game on the side of Ruwenzori about Fort Edward. On one day I saw nine elephants, and two days afterward twenty-five! None took the least notice of the caravan, although we passed within 500 yards of some of them." Referring to the navigability of the Kagera, the head-stream of the Victoria Nyanza, Mr. Elliot states that the principal obstructions, beyond Butunguru, are "the rapidity of the current, numerous bends, and the extraordinary number of hippopotami"

The Temperature of Mountain Summits.—At a recent meeting of the Académie des Sciences of Paris General Venukof communicated the results of investigations made on the summit of Mt. Ararat toward determining the temperature of high mountain elevations. The elevation of the mountain is 16,115 feet, or about 350 feet higher than that of Mt. Blanc. During the past year maxima and minima thermometers, carefully encased in a tin box, were placed on the summit by the Russian traveler Pastoukof; on the 26th day of August last they were successfully recovered by M. Zimmer, who found them normal and unhurt by the weathering to which they had been subjected. The maximum reading was +63° F., and the minimum —40° C. (—40° F.).

Mount Saint Elias a Part of the National Domain. By Israel C. Russel.—In the October number of Around the World it is stated that the work of the joint British and American surveys in Alaska has shown that Mount St. Elias is east of the 141st meridian, and, therefore, not in territory belonging to the United States, as was concluded a few years since from certain measurements made by me, and taken in connection with earlier work by the United States Coast and Geodetic Survey.

My conclusion that Mount St. Elias is within the boundary of Alaska was not based on the position of the peak with respect to the 141st meridian, as is implied in the article just referred to, but on its proximity to the coast. In proof of this I quote the following paragraph from a paper on the "Height and Position of Mount St. Elias," published in the *National Geographic Magazine*, Vol. III, December, 1891, p. 237:

"As Mount St. Elias is approximately in longitude 140° 55′ 30″ west from Greenwich, ... it is therefore only 4′ and 30″ of longitude, or 2½ statute miles, east of the boundary of the main portion of Alaska. Its distance from the nearest point on the coast is 33 statute miles. There is no coast range in southeastern Alaska parallel with the coast within the limits specified by the treaty, and the boundary must therefore be considered as a line parallel with the coast and ten marine leagues or 34½ statute miles inland. The mountain is therefore one and one-half miles south of the boundary and within the territory of the United States."

Recent surveys made by the United States Coast and Geodetic Survey do not necessitate a change in the statements just quoted, as may be seen from the following positions of the summit of Mount St. Elias, as obtained from measurements made by me in 1891, and by Mr. J. E. McGrath of the United States Coast and Geodetic Survey (this is the survey referred to in the first paragraph above, as the joint work of the British and American surveys) in 1892:

	Latitude.	Longitude.	Elevation.
1891..	60° 17′ 51″	140° 55′ 30″	18,099 feet.
1892..	60° 17′ 35.1″	140° 55′ 47.3″	18,023 "

The surveys made in 1892, instead of rendering the previous decision invalid, places the peak 15.9″ of latitude *south* of the position assigned it in 1891, or just so much farther within the territory of the United States.

In the convention between Great Britain and Russia, concluded in 1824, wherein the boundaries of Alaska are supposed to be defined, it is stated that the boundary, beginning at the south, after leaving Portland channel, shall follow the summit of the mountains situated parallel to the coast as far as the 141st meridian, and from there, northward, the said meridian shall be the boundary to the Arctic Ocean. Whenever the summit of the mountains between Portland channel and the 141st meridian "shall prove to be at the distance of more than ten marine leagues from the ocean, the limit between the British possessions and the line of coast which is to belong to Russia, above mentioned, shall be formed by a line parallel to the windings of the coast, and which shall never exceed the distance of ten marine leagues therefrom."

As already stated, there is no mountain range between Mount St. Elias and the Pacific which can be claimed to fulfill the conditions of the treaty, and as the mountain is less than ten marine leagues from the coast, it follows that it is within the boundaries of Alaska, and belongs to the United States.

Ann Arbor, Mich.,
November 5, 1894.

[We gladly make this correction, even if we have to admit that the exact "international" position of the mountain remains, to our minds, somewhat doubtful.—Ed.]

BELLAGIO, ON LAKE COMO.

HINTS TO THE TRAVELER AND NOTES ON APPLIANCES OF TRAVEL.

THE ANEROID BAROMETER AS A DETERMINATOR OF MOUNTAIN ELEVATIONS.—Mr. Whymper, in his travels among the equatorial Andes, found reason to distrust the aneroid as an instrument for accurately measuring mountain heights, and the anomalies that his instruments presented were of such a character as to make him doubt their efficiency, even in broadly approximate determinations. On elevations of from 17,000 to 20,000 feet, it was found that the departures from the reading of the mercurial column were such as to indicate errors of from 3 to 6, or, in some cases, 10 per cent.; and in by far the greater number of instances the errors were in the direction of excess of altitude. Travelers will certainly be thankful to Mr. Whymper for his analysis of this very useful instrument, and for pointing out its idiosyncrasies, even if they are not as yet, perhaps, prepared to accept the full force of his criticisms, or go the length of his condemnations. The different behavior of the several instruments which this distinguished mountaineer carried with him suggests that the discrepancies may have been due in part to deficiencies in the instruments themselves, rather than to their functions, a view that is shared by M. Bergmann, who, in a recent number of the *Revue Géographique Internationale*, contributes an interesting discussion of this general subject.

M. Bergmann believes that with proper precaution, and under judicious treatment, the aneroid may become an instrument of precision but little inferior to the mercurial barometer. He believes it an error to use instruments graduated for the greater elevations, and considers that each instrument should be restricted to spheres of some 2000 feet; thus, instruments should be constructed functionally for elevations of 0 to 2000 feet, 2000 to 4000 feet, 4000 to 6000 feet, and so on, and their behaviors under pressures, corresponding to these height-planes, and under varying thermometric conditions, be carefully studied. This suggestion has force, but it is doubtful if it can be practically carried into effect, for it is well known that the "errors of correction" of one place and time are not exactly those of another For example, the corrections that may have been made for an instrument at sea-level, or 1000 feet elevation, at New York, are not necessarily those that will be found after the completion of a thousand or two-thousand mile journey, even under strains of equal temperature. The "time aberration" of the aneroid is a remarkable one, as much so as is the direction aberration; all travelers, probably, have noted the singular fact that the reading of the barometer is different on the down-journey on a mountain than it is upon the up-journey, with a usual disadvantage for altitude on the descent. Why this should be so has not yet been satisfactorily explained.

The more the aneroid is handled the more is it made clear that before putting it to use for any very considerable mountain it must be studied for its behavior and errors in the region (and within limited areas) for which it is immediately intended, and it is undoubtedly necessary that the examinations should be repeated at short intervals. Under such conditions there is no reason why a mountain elevation, even of very great altitude, should not be determined within a margin of small error, and in the case of snowy peaks, where the light aberration is such as to interfere materially with a true sighting, with perhaps as much accuracy as in angle measurements. In regions of atmospheric stability, such as we find remarkably emphasized in many parts of the tropics or among the northern ice-fields, there is no question but that the aneroid may be made an instrument of great precision; in other regions its usefulness will depend almost entirely upon the scientific method and common sense that direct its operations. For its general usefulness it has only to be recalled that the elevations of a large number of the eastern peaks of the United States—those of the Catskills, the Black Mountains, etc.—have been established by the aneroid, directed by the intelligence and superior skill of the late Professor Guyot.

Pocket aneroids of from one and a half to three inches face, are now constructed so as to register atmospheric diminutions corresponding to 22,000 and 23,000 feet, with the reading on a single, or the rather preferable double, circle; on such, for the lower levels, differences in elevation of from 15 to 25 feet can clearly be made out. On the more improved aneroids registering to only 3-4000 feet, differences of elevation of three feet, or even less, are appreciable. For those who believe that the height of a mountain is merely the reading of the feet on the graduated scale of the instrument, it should be emphasized that this is only broadly approximate, as it leaves out of consideration necessary qualifications and modifications resulting from variations in climate, temperature, etc. The application of these checks can be obtained from the different publications which bear upon the use of the aneroid.

A Steam Yacht of Extreme Velocity.—Messrs. Simpson & Trickland of Tennington, England, have recently launched a small pleasure steamer, the *Hibernia*, which for the moment holds the "record" for rapid steam navigation. It is 48 feet 6 inches in length, and 7 feet 9 inches in width, and draws 2 feet of water. The propeller is operated by an engine of great power, sufficient to give to it a velocity of rotation of 750 to 1050 revolutions per minute. In one of its latest trials this remarkable vessel made 26¼ knots per hour against the stream, and 29 knots with the current; this latter velocity, of nearly 34 miles, is equal to what only a few years ago was the speed of a fast railway train. A deep groove is cut in the wake of the steamer with this high rate of motion, the water rising in two great diverging crests, in which small objects are tossed about as though they were passing through a storm. Travelers will watch with interest the steady development of a kind of craft which, before long, is destined to become an important element in the equipment of every fully-organized expedition.

NOTES.

Some Aspects of Arabian Architecture.—To those who have come to believe that high houses represent a strictly American phase of architecture it will be a genuine surprise to learn that in parts of Arabia, as stated by Mr. Theodore Bent in an address delivered before the Royal Geographical Society of London, true rivals to our sky-soaring residences are plentifully to be met with. Speaking of the houses of the Hadramut, in the southern portion of the Arabian peninsula, he says: "There is a decided monotony about Arab architecture. Most of the houses are exceedingly high, some reaching eleven stories; they are built of sun-dried bricks, and are externally decorated with chevron and zig-zag patterns. There is always a terrace on the roof, where the people sleep in the hot weather, and they are usually decorated with turrets, domes, machicolations, buttresses etc., which give them quite a mediæval appearance. Outside in the courtyards the flocks and herds are kept and the horses are stabled at night. The lower story is devoted to the storing of goods, the second story is inhabited by the servants, the third by the guests and above that come the harem and the family dwelling-rooms. The wood-carving is very well executed. Most of the doors are elaborately carved; the unglazed windows are fitted with pretty tracery; the beams, the cupboards, the invariable coffee corner and the household utensils, are all subjects for the carver's art, and in this they excel exceedingly. Dados, with quaint patterns, run up the sides of the walls, and each story is furnished with its skin or *mussack* of water, which is hung in a draught so that the contents may be kept cool. Each story, too, has its bath room, where a big jar called *Kazba* is placed, and the bath taken by throwing water over the body by means of a smaller utensil. The drainage is lamentably deficient, and is carried by long wooden spouts into the yard below; the dry climate and the sandy soil are the only security against disease. The palaces of the Sultans and great men of the Hadramut are exceedingly imposing, and, when seen through the surrounding palm groves, form delightful pictures."

The Great Trans-Siberian Railway.—This longest of all railroads, which is intended to open direct steam communication between the heart of Russia and the Sea of Japan, at Vladivostok, is now well under construction, and not impossibly before the passing of another decade it will be completed throughout its entire extent. The length of the Siberian line, which leaves the Russian frontier at Tcheliabinsk, about 200 miles east of the town of Ufa, is placed at 7112 versts, or 4715 miles, and traverses 75 degrees of longitude, or more than one-fifth the circumference of the globe on its own line. (The American Pacific railroads, with their eastern connections to New York, are comprised within 50 degrees of longitude.) From Tcheliabinsk to Irkutsk the road follows, in greater part, pretty directly a line contained between the 54th and 56th parallels of latitude, but after rounding Lake Baikal it falls to the 52d parallel, and at its terminus, at Vladivostok, drops still nine degrees further south. The total cost of the road is estimated at somewhat less than

350,000,000 (paper) rubles, or, approximately, $175,000,000. The condition of the work on October 1, 1893, as stated in the consular report of Consul-General Crawford, at St. Petersburg, was as follows: On the section from Tcheliabinsk to Omsk, 80 per cent. of the roadbed was completed, 28 bridges had been constructed, rails laid for 240 versts, and telegraphic communication opened with Omsk. On the second section of the Western Siberian line all the necessary materials have been prepared, 751,000 cubic feet of earthwork handled, and three station buildings constructed. On the middle Siberian section, between the Ob and Krasnoyarsk, final surveys have been made on 300 versts, and the engineers were engaged on the remainder; 833,000 cubic feet of earthwork had been completed, 20,000 railway ties had been prepared, and 3375 tons of rail received. This section of the road is expected to be completed in 1898. Comparatively little had as yet been done on the Ussuri line, and work on the Transbaikal section was not expected to begin before 1895. It is officially announced that the road would be open for traffic between Tcheliabinsk and Omsk, a distance of 880 miles, by the middle of October of the present year.

THE DEAD OFFERINGS OF THE SEINE.—The official data furnished for the year 1893 show that in that period there were recovered from the Seine the cadavers of 5652 dogs, 3307 cats, 9108 rats, 1720 chickens and pheasants, 3042 other birds, 4209 hares or rabbits, 789 pigs, 7 calves, 4 hedgehogs, 33 horses, 15 sheep, 2 colts, 13 monkeys and 6 serpents—a mortuary list of 27,907! This prodigious number of remains obtained from a single river (and by far the greater number probably within the precincts of Paris itself?) furnishes an interesting chapter to the law of appearance and disappearance of animal forms in the great struggle for existence.

GIANT HOUSES IN NEW GUINEA.—In a communication on recent exploration in British New Guinea made to the Royal Geographical Society of Queensland, Australia, by its President, Mr. J. P. Thomson, stress is laid upon the healthfulness and great beauty of much of the region. Many navigable streams are indicated which are bathed on either side by all but impenetrable primeval forest, or lined by well-cleared and cultivated gardens, in which the natives raise taro, sugar-cane, edible hibiscus, yams, and bananas. Along most of the water-courses native villages are thickly scattered, and these are inhabited by numerous warlike tribes, who on several occasions have opposed the friendly advances of Europeans with formidable hostility. The most surprising fact connected with these settlements is the enormous size and massive, even architectural, structure of many of the houses. It is claimed to be by no means uncommon to find houses 300–400 feet in length and over 100 feet in height! Truly, such houses are among the largest of the world, and they even surpass the vast piles of Central America and Mexico.

THE HORSES OF FRANCE.—We learn from *La Nature* that the number of horses to-day in France is approximately 3,000,000, with a valuation of 1361 millions of francs. This number is less by about a half million than that of Germany, but the ratio to surface-area and population is somewhat greater in France; thus in France there are assumed to be eight animals to every 100 inhabitants, whereas in Germany this number is reduced to seven and a half. Of the full number 7,800,000 are employed in city service, about 150,000 belong to the army, and the remainder are country "agriculturists." The latest official statistics published by the Ministry of Agriculture show that the horses in the country districts increase more rapidly than the rural population, a condition that naturally lends itself to the betterment of the transportation service. It is claimed that there is to-day not a single city without its several lines of tramway, the low rates of passage on which make them available to all. Previous to 1870 there were said to be only 70,000 horses in Paris; to-day the number is 120,000.

THE UNOCCUPIED TERRITORY IN THE UNITED STATES.—According to the report of the Secretary of the Interior the unoccupied public lands of the national domain still embraced, up to the close of June, 1892, upwards of 500,000,000 acres (or more exactly, 567,586,783 acres) largely available for homesteads, but unfortunately in great part occupying regions of half-desert or where a natural irrigation hardly exists. The distribution of this vast area is approximately as follows: Montana (74,600,000 acres), New Mexico (54,700,000), Arizona (54,600,000), Wyoming (52,000,000), California (50,000,000), Nevada (42,400,000), Colorado (42,000,000), Oregon (38,400,000), Utah (35,200,000), Idaho (34,200,000), North Dakota (19,500,000), Washington (19,000,000), South Dakota (13,000,000), Nebraska (11,000,000), and Oklahoma (6,300,000). Additional minor tracts also occur in Arkansas, Florida (2,800,000 acres), and Louisiana. Alaska is not considered in this enumeration.

THE POPULATION OF ITALIAN CITIES. —A recent number (July) of the Italian geographical review, *Geografia per Tutti*, gives the following tabulation of the growth of the ten largest cities of the kingdom, with the populations calculated for the close of the years 1871, 1881, and 1891 :

	1871.	1881.	1891.
Naples........	448,365	494,314	518,110
Rome..........	244,484	300,467	436,179
Milan	261,985	321,839	424,195
Turin...... ...	212,644	252,832	331,180
Palermo......	219,398	244,991	272,039
Genoa.........	161,669	179,515	211,355
Florence......	167,093	169,001	198,404
Venice.	128,901	132,826	146,415
Bologna......	115,957	123,274	143,471
Catania.......	84,397	100,417	117,519

The remarkable development of Rome, with an increase to its population of 80 per cent. in a period of twenty years, is attributable to its being the seat of government, Victor Emmanuel having removed thither from Florence in 1870. Due naturally to the same cause is the stability or decadence of Florence, the one-time capital (1865–70), which in the period of 1871–81 appears actually to have increased its population by less than one and a quarter per cent.! Since 1881, the least progressive city of Italy, so far as population is concerned, is Naples, where the increase has been only (somewhat less than) 5 per cent.

THE NAVIGATION OF GERMAN RIVERS. —A recent number of *Das neue Ausland* presents an interesting *résumé* of the shipping activities of the fifteen "water districts" which are recognized in Germany, those of East Prussia (with the *frisches Haff*), the Vistula, Oder, Baltic, North Sea, Elbe, Weser, Jade, southern North Sea (East-Friesland), Frisian canals, Ems, Rhein, Sea of Constance, Danube, and the Upper-Bavarian lakes. The number of vessels belonging to these waters was, in 1892, 22,848—21,318 sailing vessels and 1530 steamers. More than one-half (53.9 per cent.) of all the German vessels belong to the Elbe (12,308); the Oder, which has the next largest number after the Elbe, counts 3484 vessels (196 steamers), and the Rhine 3220 (323 steamers). The Danube, within German territory, is navigated by 130 vessels (4 steamers), and 10 (of which 9 are steamers—probably excursion-boats) are credited to the Bavarian lakes. The general insignificance of the German craft may be inferred from the fact that in the entire Elbe district there is not a single vessel registered to 800 tons, and there were only 70 whose tonnage exceeded 500. Only on the Rhine is the larger registry to be met with, 25 sailing vessels being entered for a tonnage of 1200. On the Oder there is no vessel with a capacity exceeding 400 tons. As regards the engine-power of the steamers the Rhine again stands ahead, but even here there appears to be but a single steamer of 1400 horse-power; the most powerful of the Elbe steamers are of only 700–800 horse-power. The greater number of the German passenger steamers are of less than 50 horse-power, and there appears not to be a single towboat whose working capacity passes beyond 300 horse-power. Of course in this enumeration no account is taken of the ocean navigation which belongs to the mouths of some of the larger rivers.

LHASSA, THE "FORBIDDEN," SUCCESSFULLY ENTERED.—From advices contained in the *North China Daily News* it would appear that this remarkable city, which has so long tempted travelers in its direction, and as long kept them from its gates, has been finally entered by two Russians, Menkhudjinow and Ulanow, who, disguised as Tartars, and fully conversant with the Mongolian language, successfully evaded the vigilance of the different dignitaries who guard the approaches to the capital. In a period of two years and seven months these energetic travelers crossed the entire continent of Asia, following the route from Astrakhan, *via* Lhassa and Kuku-Nor, to Peking. It will be remembered that the Swede, Sven Hedin, recently attempted an entry into Lhassa, but, like Rockhill, who preceded him, failed in his effort.

THE JACKSON-HARMSWORTH POLAR EXPEDITION.—The latest information that has been brought regarding Mr. Jackson's vessel, the *Windward*, would seem to indicate that instead of being entangled in the ice of comparatively low latitudes, as has been several times reported, she was heading, in a comparatively unencumbered sea, directly for her point of destination, Francis-Joseph Land. When last observed, as stated by the captain of a recently returned Norwegian walrus sloop, the vessel was to the northward of the 75th latitude.

January, 1895.

Around the World

MONTHLY.

No. 14.

IN THE GARDEN OF THE ALHAMBRA.

EDITED BY PROF. ANGELO HEILPRIN.

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Around the World.

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THE BEAUTIES OF CORSICA.

DR. R. F. SCHARFF.

THE interest which for the moment has been revived in the life of the great Napoleon calls attention to the land of his birth, a fleeting but charming picture of which has been presented by Dr. Scharff to the Senckenberg Society of Frankfort. The essentials of the Doctor's address are here given to the reader:

From the far distance, almost before the outlines of Corsica are themselves visible through the morning dawn, the odors of aromatic plants are wafted across the approaching vessel's prow. Presently the island itself appears, a huge colossus of mountain form, half-drowned in the water in which it is immersed. By many geologists, in truth, Corsica and Sardinia are considered to be merely the remains of an ancient continent, over whose sunken surface the swells of the Mediterranean now gently ride. How far this ancient continent was formerly united with either Europe or Africa, is a problem toward the solution of which science awaits the verdict of the zoologist and botanist.

In its surface outline Corsica presents the form of an elongated leaf, with the stem directed toward the side of France and the Alps. It measures 113 miles in length, and about 52 miles in width. Although properly a dependence of France for a period of full one hundred years, it is nevertheless hardly to be wondered at that the language of the people—some 278,000, according to the census of 1886—remains Italian; both geographically and historically the associations of the land are with Italy. A chain of granitic mountains traverses the island from north to south, dividing it into an eastern and a western zone, and from its centre rise the imposing peaks of Monte Cinto (8890 feet), Monte Rotondo (8608 feet), and Pagli-Orba (8200 feet). Barring a small strip of coast-land on the east and some swampy tracts in the west, the climate must be considered a healthy one, and by many Ajaccio is to-day preferred to the Riviera for the treatment of asthmatic and lung troubles.

Ajaccio, which is reached in a fourteen-hours' sail from Marseilles by the palatial steamers of the Compagnie Transatlantique, lies on the foot of a range of vine and olive-covered hills—the "Serra"—whose upper parts are densely covered by the common Corsican "machie," or bush. Within the shade of the olive grow great clumps of the Indian-fig or prickly cactus, whose fleshy inch-thick leaves have long served the youth of the city as targets in their stone-throwing practice; decayed and decaying fragments of the plant lie everywhere scattered about, a shelter to great numbers of scorpions and of other insect vermin. The country about the capital has, however, suffered too extensively from the hand of the cultivator to offer much to the naturalist, and it is only when the Campo dell' Oro is reached, some three miles distant, that zoological or botanical material can be obtained in any diversity. From this point the eye commands a magnificent panorama of mountain and ocean, sweeping up to the snow-clad (as we still found it in February) summit of the Monte d'Oro. North of the town, occupying an elevation of 2165 feet, is the famous white castle of Duke Pozzo di Borgo, built of stone from the Tuileries of Paris, and intended, as the inscription signifies, as a precious gift to Corsica of a portion of the French nation ("*pour conserver a la patrie corse un précieux souvenir de la patrie française*). Small copses of eucalyptus here and there break with picturesque effect the continuity of the landscape, whose atmosphere is redolent with the perfume of cistus, diotis, and lavender.

To an extent the Campo dell'Oro has itself been given over to cultivation, but as in nearly all parts of Corsica, barring the wonderfully maintained "*routes nationales*," all traces of the plough and harrow disappear within a short distance of the coast. Beyond the border-land of a mile or two all is native bush, the so-called "machie," a wild growth mainly of arbutus, myrtle and mastix, over which are intertwined the closely-laced stems of the maritime smilax (*Smilax maritima*).

At the present time railroad communication extends from Ajaccio only as far as Vivario, but the construction of the line is contemplated to Bastia, on the opposite side of the island. In less than two hours' time we mounted to an elevation of 3000 feet. Nowhere in Europe is the traveler transported with such rapidity from the lower zones of floral luxuriance to cold mountain summits —from flowering roses and heliotropes to evergreens and chestnuts, and from these to stately firs, still wearing their garniture of winter's snow. . . . In twenty minutes the road descends on the opposite face of the mountain to Vivario, which, like nearly all of the Corsican towns, is a poverty-looking nest; but, as if in compensation for its forlornness, it commands a superb view of snow-clad mountains, of richly-verdant slopes of fir and chestnut, and the wooded plains below. The traveler is here transferred to the *diligence*, an old-time construction in the manner of the ancient mail coaches. Numerous black crosses implanted upon the road bear witness to the still-existing "vendetta," and mark the spots where ignoble man has slain the cursed; our driver laughingly referred to them as "accident" indicators.

An interesting journey of two hours brought us to Corte, one of the most picturesquely located towns that can well be imagined. Perched high upon its rock-pedestal, it looks back to the snow-capped mountains, and proudly down upon the two mountain torrents, Restonica and Tavignano, which tear around its base. Here it was that the gallant General Paoli made his brilliant stand against the Genoese. With all the charms of its surroundings we were denied the full pleasures of our visit, as we were mercilessly followed day and night by the city urchins, and in various ways molested by them. Foul odors and cloacal emanations, moreover, impress a decided shady side to this otherwise attractive spot. In the valleys east of Corte game is still plentiful, the wild boar, Corsican stag, and various forms of hare being still met with in greater or less abundance. The stag, which is seemingly only a variety of the common European animal—identical with the form of North Africa—is to-day rapidly disappearing, and is perhaps to be found only in the forests of Bonifacio.

Bastia, with its surrounding copses of fever-imbibing eucalyptus, is reached by rail in four hours from Corte. It is strictly a commercial city—the most important of the island—and perhaps on that account receives but little attention from tourists. The journey over the mountains to St. Florent, however, well merits the expenditure of energy that is involved in its making. We climb to 1500 or 3000 feet, following principally goat-paths if we wish to depart from the beaten road, and enjoy beautiful vistas over mountain and sea, the town of St. Florent, and the dim and far-distant Tuscan islands. I was much pleased to run across the mountain salamander (*Molge montana*), which has generally been assumed to belong to the higher mountain districts, and yet more surprised to find that the animal, chameleon-like, possesses the power of directing its coloring in accordance with its surroundings. Placed on a green leaf, the body ultimately acquires a green cast or shimmer; and I had occasion to observe in my aquarium in Dublin, whither I was fortunate in transporting some of these animals, that when put on a red rock or pebble, the body turned much to the color of those objects.

A NEW PICTURE OF THE DARK CONTINENT.—THE BRITISH CENTRAL AFRICA PROTECTORATE.

TO those who know the African continent only from the side of nightfall, of human and bestial savagery, and of lurking miasma, the following picture* of the British Central Africa Protectorate, presented by Mr. H. H. Johnston, the Admin-

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*Abstract prepared for publication in *Nature*.

istrator, to the Royal Geographical Society of London, will come in as a pleasant relief to old-time conceptions :

Roughly speaking, about four-fifths of its land surface is 3000 feet and upwards above the level of the sea, and about one-fifth is between 5000 and 10,000 feet. The immediate result of this elevation of the land is the prevalence of a much cooler climate than is usually found in Central Africa so near the equator. There are portions of British Central Africa where the heat is never oppressive, even in the hot season, and where in the cold season bitter frosts prevail. Unfortunately it is impossible to reach this delectable land from the coast without traversing the hot and unhealthy valleys of the Zambesi and Shiré.

There is an average rainfall of 55 inches throughout the Protectorate, but it is not altogether uniform in character, some districts receiving about 75 inches, and others not more than 35 inches. Still, it is decidedly a well-watered country, endowed with many perennial streams, only a small number of which dry up in the height of the dry season. Consequently, it is a land which can almost everywhere be irrigated during the dry season, and can thus grow a continual succession of crops. The water is almost everywhere wholesome to drink.

The great attraction of the country lies in its beautiful scenery, in its magnificent blue lakes, its tumultuous cascades and cataracts, its grand mountains, its golden plains and dark green forests. A pleasant and peculiar feature also of the western portion of the Protectorate is the rolling grassy downs, almost denuded of trees, covered with short turf, quite healthy, and free from the tsetse fly ; these no doubt will in the future become actual sites of European colonies, districts in which Europeans can rear their children under healthful conditions.

The lofty plateau of Mlanje is a little world in itself, with the exhilarating climate of Northern Europe. These plains and valleys are gay with blue ground-orchids, with a purple iris, and with yellow everlasting flowers. Here and there great rocky boulders stand up in stern relief against the velvet turf, and out of these elevated plains again rise other mountains, gloomy in aspect and remarkably grand in outline. The forests, on closer inspection, turn out to be mainly composed of the handsome conifer, *Widdringtonia Whytei.*

No one has succeeded in reaching the highest summit of Mlanje. Mr. Johnston ascended about as far as 9300 feet, and estimating that there were fully 700 feet more of ascent, approximately fixed the highest point at 10,000 feet. The ascent of this high peak is rendered very difficult by the enormous size of the boulders with which it is strewn. The whole mountain mass of Mlanje probably occupies, with its outlying peaks connected by saddles, an area of 1600 square miles, of which 200 square miles consist of these level or gently undulating plateaux, admirably suited for European settlements. Many of the salient features of Mlanje, are repeated in the striking mountains of Nyassaland, with the exception of the cedars, which, however, are reported to exist on one or two of the highest peaks of Zomba, but have never been seen elsewhere.

The low plains surrounding Lake Nyassa and bordering the rivers offer a sharp contrast to the plateaux. Zebras, hartebeests, water-buck, pallah, roan antelopes, and reedbuck may be found in numbers, often dwelling gregariously together on these hot plains ; and a few vultures, eagles, kites and marabout storks wheel and float overhead in the dazzling bluish-white sky, on the lookout for offal. The sable antelope, the eland, the kudu, and the bush-buck seem to prefer the sparsely forested hill-slopes to the flat plain, where there is usually much less cover. The rhinoceros still ranges over these plains, and wallows in the stagnant pools of the half-dried rivers. The heat prevailing on the plains in the summer time is very great—almost overpowering—but in the winter and spring the air is exhilarating.

The British settlements have now a settled and comfortable appearance, with uniformed native policemen and trained natives from the mission schools working as printers or even as telegraph operators at Blantyre. The most interesting feature in the neighborhood of these settlements at the present time is the coffee plantation, which, to a great extent, is the cause and support of their prosperity. The variety which is cultivated in the Shiré highlands was actually introduced from Scotland, having been derived from a small plant sent from the Edinburgh Botanical Gardens to Blantyre about sixteen years ago. From this plant the greater part of the five million coffee trees now growing in this part of Africa are descended, while the original mother tree is still alive in the Mission grounds at Blantyre. The climate and soil of Nyassaland would seem to suit the coffee tree to perfection, and the crops given are unusually large. As yet Nyassaland has been free from the coffee disease, which, as in Brazil and India, does not appear to be able to penetrate far inland from the coast, though it has already committed ravages in German East Africa and in Natal.

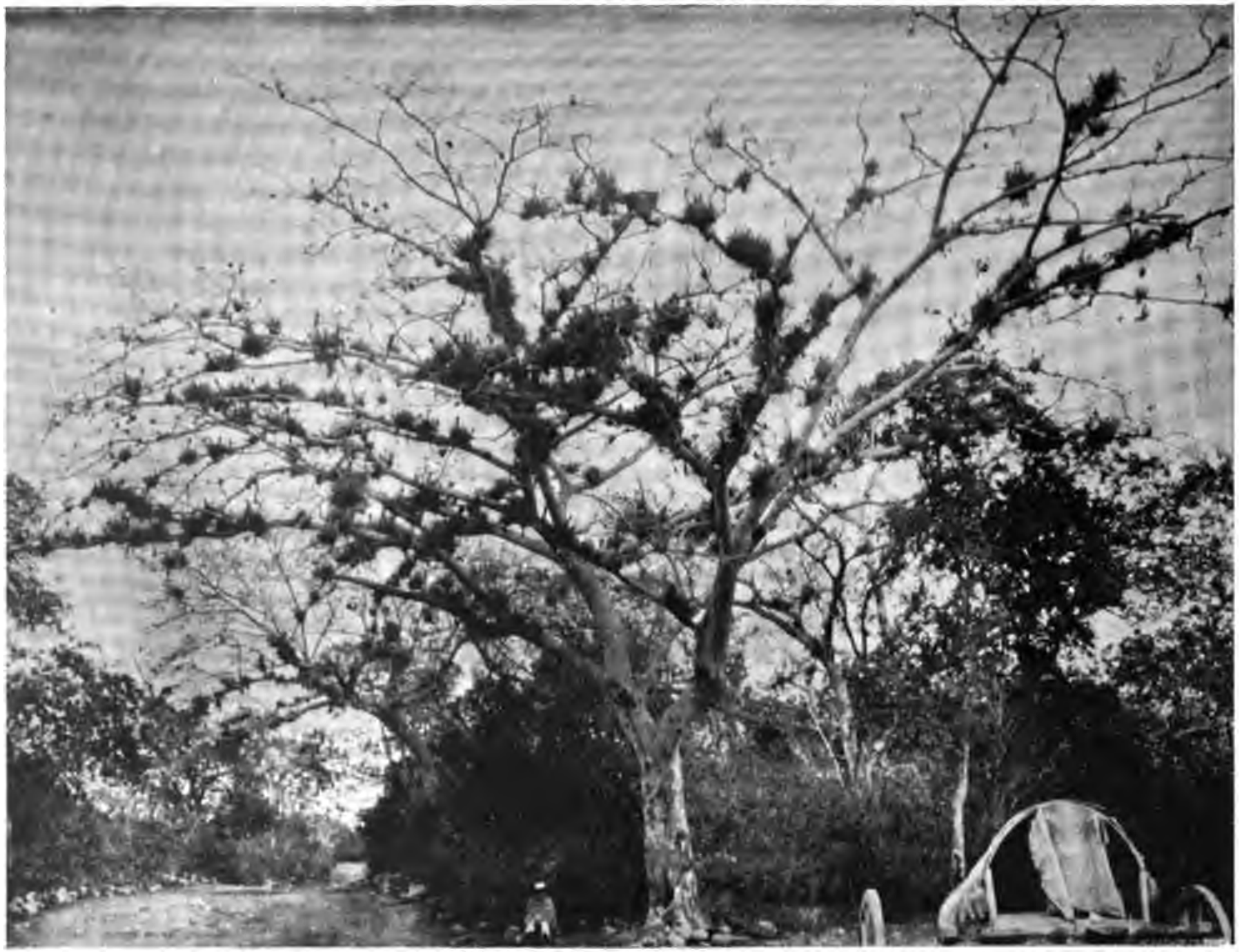
WILD BEASTS AND THEIR WAYS.

ANYONE who carefully wades through the voluminous literature bearing upon the habits of wild animals will be struck by the disparity of opinion which prevails regarding what would appear to be even the most salient traits of those animals. It is really of no great consequence, except perhaps to the gentle intruder upon its haunts, whether the lion is a coward, as it has of late years become the fashion, following the course of the destructive criticism which has been applied to the "great" Napoleon, to consider him, or if, by virtue of his prowess, he is justly entitled to the designation of "king of beasts." Again, it is of no particular consequence whether in the pursuit and destruction of his enemy the elephant scores his triumph by trampling his victim under foot or by transfixing him with his tusk or tusks; each method would seem to be equally appropriate, and few could take exception to the special course adopted. But opinion as regards these and other methods, and the possibility of their execution, differs, and it becomes an interesting inquiry to ascertain why opinion on such simple topics (problems?) should vary, and wherein lies the actual truth.

Travelers, as is well known, are prone to exaggerate, perhaps not with malice intent, but with a pleasurable tendency to broadly emphasize the full value of their researches and discoveries. The excitement of a moment, of an hour, or of a day, with its attendant pleasures and pains, is jotted down in the supposedly ever-present note-book, and probably in nine cases out of ten under the influence of such excitement. It is therefore, that in mountain catastrophes the scenes of disaster are vastly magnified, precipices of moderate slope are made vertical, moderate rifts, whether in ice or rock, are made into yawning chasms, the billows of the sea are tossed into mountain elevations, and the swaying structures which straddle the earthquake tremor are thrown into pendulum oscillations. Similarly, in the wild chase over the karoos and plains of South Africa the swiftest horseman finds it difficult to escape its fleet pursuer, whether elephant or rhinoceros, he is fascinated by the thunder-like roar of the lion, and is tossed harmless into the air by a Cape buffalo which brushes against his bodily frame with the gentle intensity of an express locomotive. One traveler, and that a man of learning and reputation, even survived the coursing of a rhinoceros over his ribs by the very simple process of drawing breath, or inflating himself, at the proper moment.

Fortunately there are many travelers who are as scrupulous in their adherence to the truth, or what may at the time appear as the absolute truth, as the most of devout believers in unalterism could well wish them to be; but, again, there are those who err in what they choose to call the safer side of exaggeration, *i. e.*, the negation. In this category may be classed those who habitually derogate from the better qualities of mind and body, who deny the existence of any form of intelligence in beast and rob him of all such qualities as goodness, strength or valor. The eye of the stranger attentively fixed upon the visual orbs of the lion will vanquish the monarch of the desert (or in fashionable parlance, stare him out of countenance), but perhaps most persons will prefer to believe with Andersson that "under ordinary circumstances" a hungry lion "does not spend any time gazing on the human eye . . . . but takes the easiest and most expeditious means of making a meal of a man." The tiger, according to the very accurate Sir Joseph Fayrer, rarely, if ever, "bounds when charging," but Mr. J. H. Baldwin recounts the instance of an animal leaping the stockade of a cattle-pen "with a large, full-grown ox in his mouth," and Mouhot has as much to say with regard to the relations of the tiger and the buffalo.

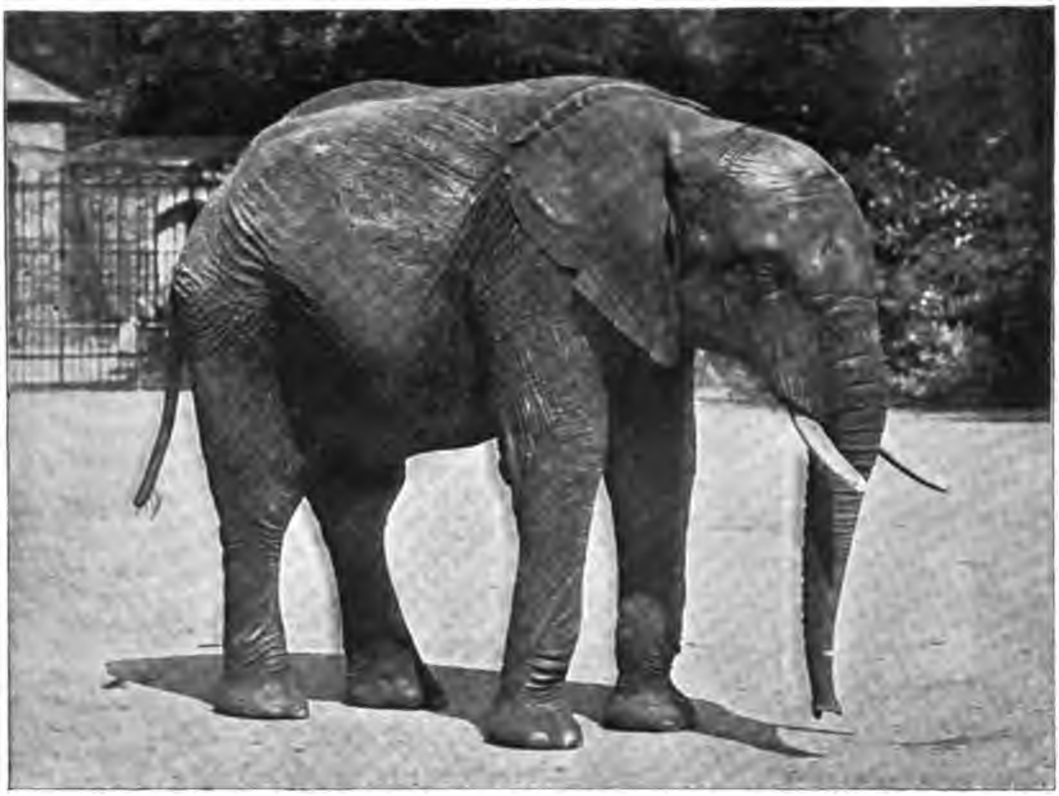
But then this diversity of opinion attaches not alone to the habits of these animals, but likewise to their stature, bulk and form. The late Sir Samuel Baker gave a rude shock to our notions of 12-13 foot elephants when he blankly affirmed that no elephant that he had ever met with—and he had met hundreds—rose above the 10½-foot line; and it would probably be equally difficult to discover, even among badly-stretched museum specimens, the lion that would anywhere nearly match the twelve and thirteen foot specimens of Buffon and Andersson. The famous 10-foot polar bear of Kane dwindles down to a respectable 7-foot animal when the measurement is made without regard to mental pictures of limitless space, in the same way that the 17-20



AN ANCIENT FORESTER OF YUCATAN; PICH TREE COVERED WITH EPIPHYTES.

foot alligators of the Florida waters compose themselves to a normal twelve or thirteen feet when the reflections in the water are removed from their bodies.

It is with the view of placing these incongruities of statement side by side, and of sifting out their evidence, thereby arriving at a just estimate of the facts regarding a number of the more "popular" of the feral animals, that Mr. J. Hampden Porter has given to the public his very readable and entertaining, even though not profound, essays* on the characters and habits of the elephant, lion, leopard, panther, jaguar, tiger, puma, wolf and grizzly bear. The book is largely a vindication of the strength, ferocity and boldness of these animals, less so of their higher mental attributes and of their regard for man. Indeed, it would seem that their utter disregard for man is their most marked characteristic. The lion is restored to the position which he probably justly occupied, that of the "king of beasts," all evidence as to his cowardice or magnanimity through fear being considered disproved. The reader will find much interesting matter scattered through the pages, scarcely any side of the habits of the animals which are monographed being left untouched. It is probably safe to say that under no cover have so many biographic facts, good, bad, and indifferent, pertaining to animal history been brought together. The author shows himself to have been an extensive reader, and has well familiarized himself, partly through personal contact, with the life-histories of his subjects. It is much to be regretted that he exhibits a pleasurable tendency to run foul of his predecessors in his field, and he loses no op-



THE ELEPHANT.

[*From a photograph by Gambier Bolton. Copyright.*]

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* Wild Beasts. A study of the characters and habits, etc. New York: Charles Scribner's Sons, 1894.

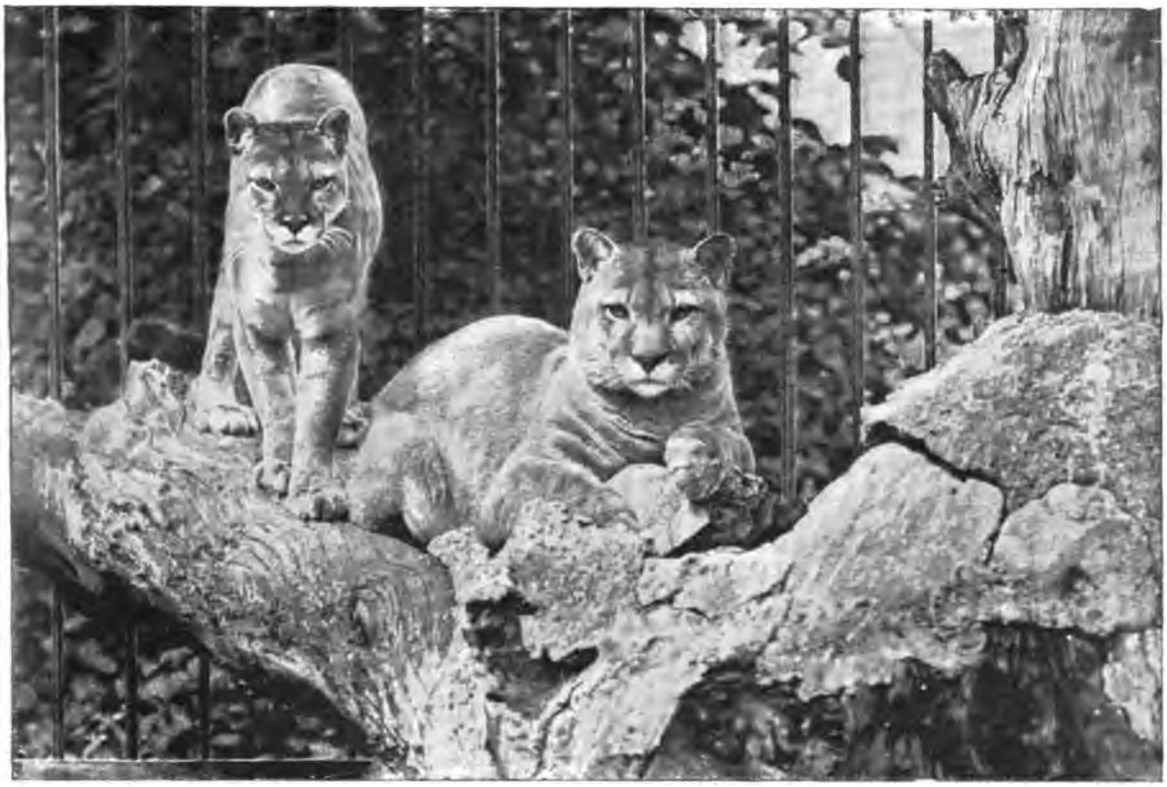
portunity to inform the reader that previous to the appearance of his work the combined positive knowledge regarding his pets was practically nil. The key-note to the book is found on the second page, where, in speaking of the elephant, it is noted that it is a social animal and that the herds are constituted by, and dissociated into, family groups or units, and "with this statement anything like unanimity of opinion among authorities upon elephants is at an end." Mr. Porter is manifestly not a scientist, nor even a deep thinker, although his occasional references to, and quotations from, works of a philosophic character might lead one to believe that he had made a deep incursion into the realm of nature, otherwise he would hardly have ventured the statement that one of the "counts" upon which "My Lord, the Elephant" takes precedence of other animals, is "that he belongs to an ancient and isolated family, which has no near relations occupying lower stations in life;" that "the biological law is that the characteristic features of species, whether physical or mental, are not developed until maturity" (p. 3); that "what is true with regard to the present geographical distribution of the cats, has been true always; throughout their fossil history the greater and more formidable *Felidæ* have been confined to the Eastern Hemisphere" (p. 257); that the cats "are adjusted to their place in nature better than other creatures and also much better than the human race;" and finally, that these animals "have persisted from a period so incalculably remote, that the *Felidæ* may in this respect be said to stand by themselves."

The most valuable contribution to knowledge contained in the book, and forming certainly a very readable and entertaining chapter for it, is the account of the author's pet puma or American lion, Gato, which, under the kindly favors of its master, developed for him an attachment which was no less remarkable than lasting. From this account we extract a few paragraphs as throwing light upon the particular tendencies of this animal:

"The panther's way was a very simple one. It consisted in looking to the being he had come in contact with for everything he wanted, and resolutely refusing to enter into intimate communications with any one else. Nobody who knew him could say that the least feeling of affection ever warmed his heart, but it was plain enough that while he contemned the human race, one man was tolerated, and a distinction made between him and all others. Some individuals he detested at first sight, and resented the slightest approach to familiarity. For the remainder he entertained a quiet contempt; but as for fearing them, nothing was further from his thoughts. . . . Candor compels the admission that flattering as would have been some tokens of disinterested affection, he never gave any. What he did was to please himself. When he had no desire to be taught, which was often the case, a more stupid, sulky and unsatisfactory pupil could not be imagined; but when his interest happened to be excited he was quickness itself, and he seldom forgot. One might as well have caressed a stuffed cat, or tried to romp with a dead one, as to have expected any recognition of advances in these directions when Señor Gato felt disposed to contemplation, and if compelled, as of course was the case sometimes, to do anything against his humor, he was not accustomed to leave any doubt about the disgust and anger which possessed him. . . During one part of his wardship the periodical absences of his only friend put him out greatly, because, so far as actions revealed the creature's feelings, they interfered with his comfort. He became dangerous when grown, and occupied a room by himself, from which he was not removed while his guardian was gone. Under ordinary circumstances he was released for several hours every night, and when the time came, if there was any delay, he began to call upon his comrade to let him out, and grew fierce if not attended to. No one ever knew him to take any violent exercise in this apartment, but the gymnastic performances that he went through outside were worth seeing. After being confined in solitude a couple of days, which was the length of time his friend generally remained absent, his eagerness to see him back became excessive, according to all reports He was restless, savage and sometimes refused to eat on the last evening. The servants said that long before they themselves heard the horse's tread, it might be known from Gato that his liberator was coming. But he never welcomed him as a horse or dog will do. . . . Gato resolutely refused to learn English. Why he preferred Spanish no one knows, but he did, and would only respond to communications made in that tongue. Habit and association had much to do with this, no doubt, but there is reason to think that a distaste for our vernacular was one of the many prejudices which, in a measure, detracted from those qualities which embellished his character. His guardian discoursed to him at length ; taught him to do and leave undone numerous things, but had to use the only idiom his pupil chose to acquire any knowledge of. If he were called in English, the preverse creature would not come. He stood and stared like an obstinate child. More than this, if he understood, as no doubt he sometimes did, and even wanted to do what was commanded, but could not, because he had made up his mind never to do anything unless spoken to properly, he got angry."

We cannot take leave of this interesting animal, whose biography has been so well written, without feeling regret for the untimely death, through shooting, which overcame him. Chapters in animal history, such as the one that Mr. Porter has given to us, are always interesting reading and worthy of a place in the permanent literature of science.

Mr. Porter's work is pleasantly illustrated with photographic reproductions, which in most cases have well caught the spirit of the animals depicted. Two of these, the elephant and puma, are used to illustrate this article, and require no comment on their life-like representation.



THE PUMA.

[*From a photograph by Gambier Bolton. Copyright.*]

THE EXTREME COLD.—In the Bulletin of the Italian Alpine Club Signor A. Mosso contributes an article on the extremes of cold to which organic life is subjected, and instances the period of February, 1892, in eastern Siberia, as the coldest that has yet been recorded. It is stated that at some locality south of the 67th parallel of latitude the thermometer registered —69.°8C (—93° F), an almost incredibly low degree of heat. The observation is not unlikely erroneous.

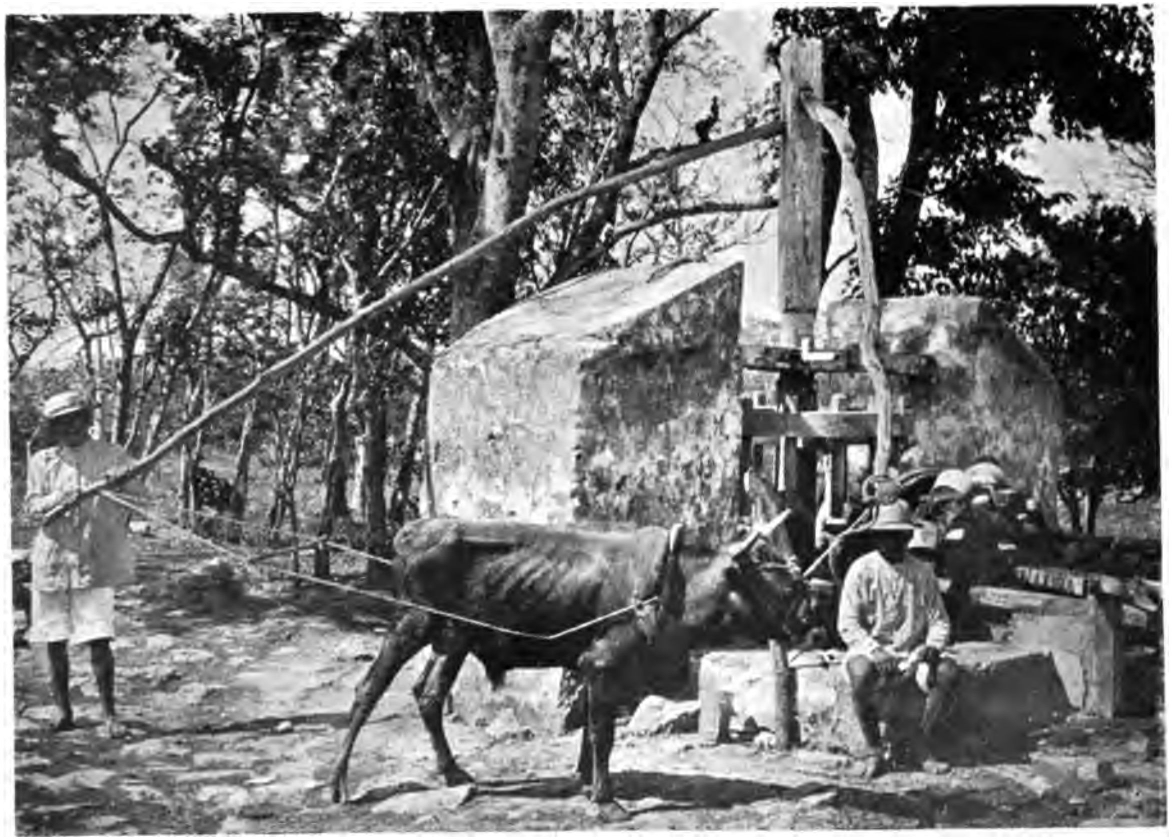
THE BAZAAR OF CONSTANTINOPLE.

IT has often been remarked that every city is distinguished for something, beyond architecture and art-treasures, which is characteristic of it; certain features are more representative of the traits and habits of the inhabitants than others, and stamp the locality. Such a one is the Grand Bazaar of Constantinople, of which the able geographical journalist, Mr. Adolphe Smith, furnishes an interesting picture in one of his correspondences:

The Grand Bazaar is one of the most remarkable sights of Constantinople. This labyrinth of alleys, little streets and domed corridors is filled with shops, where most of the trade of the town used to be done. Now much of the trade and wealth has gone over to the Pera side, and there the goods are shown in shops which are constructed like the shops of western Europe. Still, all visitors to Constantinople like to go to the old bazaar, if only to see the busy crowd and the quaint arches, where a subdued light is so contrived that the purchaser can hardly see whether the objects shown are old and soiled. But these arches have now been shaken down by the earthquake. Most of the shops are destroyed and many of the dealers wounded or killed. I consequently saw a very different sight to that described by many travelers. I was, for instance, shown an archway where a man used to sit and sell water. The houses round about fell in and buried this man in the archway. There he lived three days with nothing but his stock of water to sustain him. At last he was dug out, sound of limb, but very hungry.

To make purchases at the bazaar is a matter of no small difficulty. Europeans are generally charged two or three times the value of the articles they manifest any desire to acquire. Doubtless in London the same objects could be bought cheaper than at Constantinople, and all the trouble of bringing them over would be avoided. With a London tradesman there is a certain guarantee. He has to maintain his reputation, so that, on the whole, I should feel safer in buying a Turkish carpet from a respectable London tradesman than at the Constantinople bazaar. But I, nevertheless, succeeded in making a few good purchases in Constantinople, but this solely because I was accompanied by a friend, a Turkish professor. When the dealer mentioned the price, my friend turned angrily upon him explaining that he was a Turk. Thereupon the dealer humbly apologized, and was anxious to sell for a third of the figure he had originally mentioned. It is not easy, however, to find a friend who is a Turk, and who will have the kindness to do the bargaining for you, unless it be a Turk who makes a business of it, and therefore gets a big commission out of each transaction, and then there is but little advantage gained. Finally, it must be borne in mind that any articles carried in the passenger's luggage will increase the weight and therefore the cost of traveling very considerably, and there is the risk of having to pay duty at all the custom houses which have to be passed on the way from Constantinople to western Europe.

If, on the other hand, it is decided to send the things separately, some four hours must be spent at the Constantinople Custom House to get the goods through, for there is an export duty levied. This duty in itself does not much matter, as it only amounts to one per cent. on the value of the objects; but it is the time and trouble in going through the necessary formalities which constitute the most irritating and wearisome impediment. It seems strange that so little should be done to encourage trade. With the reaction that is now taking place against machine-made goods, a great trade might be done in the hand-woven silks, cottons and carpets of Asia Minor. These are infinitely more beautiful, more artistic, and, above all, more durable, than Lyons silks, Manchester cottons, or Brussels carpets. Of course they are dearer, but we feel they are the work of human beings. There is in the irregularity of warp and weft and design something that conveys the feeling of the warmth of life instead of the mathematical precision of cold machinery. But it will be difficult to trade in these articles while every dealer looks upon business and swindling as synonymous. I am quite certain that visitors and tourists to Constantinople would spend double and treble as much again if they could buy without being robbed. Of course, there is the possibility—indeed, the absolute need—of bargaining; but it is disagreeable to bargain, and it causes a terrible loss of time. Thus, many persons content themselves with a few very trivial purchases, and the Turkish dealer, in his greed for exorbitant profits, loses his customer altogether. The Bazaar will soon be built up again. Fortunately, it is not a very expensive structure, being for the most part but



PHOT. R. LE BOUTILLIER.

PRIMITIVE BULL-WELL, YUCATAN.

one story high. At first it was proposed, in rebuilding, to adopt a European style, which would have made the shops more convenient for the storing and handling of goods. Fortunately, this proposal has been abandoned, and the Bazaar will be rebuilt in the old and Oriental style, so that it will not lose its picturesque aspect. Let us hope, however, that the walls will be more secure and firm, so that should there be another earthquake, they will not fall down with the same readiness as in the past.

A DEPARTING AMERICAN RACE.

THE CARIBS.

A. H. VERRILL.

WHEN the Spaniards first discovered America they found the islands, from San Salvador to Trinidad, inhabited by a race of warlike and powerful cannibals, to whom they gave the name of Caribs. To-day they number but a mere handful, to be met with only on the islands of Dominica and St. Vincent. My references are here made only to the people of Dominica, as those of St. Vincent are so mixed with the negroes that their natural habits have nearly disappeared.

The Caribs of Dominica number about three hundred, although owing to their shyness and distrust of the whites, their numbers are much underestimated. They are confined to a small portion of the island, their principal village being Lassua on the Atlantic or windward side. In appearance they are short and thick-set, with broad, square shoulders, short necks, oval faces and coarse, straight black hair. The features are regular and sometimes handsome, especially among the young girls; their complexion varies from a clear olive to a dark copper, and with their almond-shaped eyes they might readily pass for Japanese. In habit they are quiet, industrious and inoffensive. Their villages are neat and clean, and every family has a well-cultivated field of cassava, yams, and sugar-cane located some distance from their huts in the woods. The houses are built of cane thatched with palm leaves and are raised from the ground on stumps or logs.

The costume of the men consists of a short blouse and trousers; a close-fitting palm-leaf hat covers their short hair. The women wear a loose skirt reaching to the knees and a short-sleeved "camisa;" while their hair is hung in two long braids and parted from the forehead. The Caribs care little for ornaments or ostentation of any sort; they are extremely reticent, seldom speaking unless addressed, even among themselves. A Carib language is still in use, but Spanish, Patois-French, and a little English is spoken and understood by the majority of them. They are very apt at learning a language, or, in fact, anything. A boy whom I employed during my stay among them learned to skin and stuff a bird in less than a week, and meanwhile picked up enough English to make himself understood. Despite the fact that they regard the negroes on the island with the greatest contempt, they have the curious custom of leasing or selling their children to them for a ridiculously small consideration; the boy above mentioned, although the son of a chief, had been leased for several years to a young negro in exchange for an old shotgun and a pair of scissors!

The men have long given up the use of the bow and arrow, but still retain the spear for fishing. They are exceedingly skillful in the catch of humming-birds with birdlime, a compound made from the gum of a native tree mixed with the milk of a species of milk-weed. A small twig is dipped into this mixture and then fastened to a long cane or bamboo. Armed with this the hunter starts in quest of a flowering tree or shrub, the feeding-ground of the humming-bird. Standing motionless at the foot of the tree he places the cane among the branches; presently a humming-bird darts forward and hovers among the flowers. Slowly the cane is raised until its tip is within a few inches of the tiny victim. Here it remains until the bird, glancing about for a resting-place, catches sight of the inviting twig. Then it alights, only to find itself a captive. I have seen as many as a dozen humming-birds captured in this way in as many minutes from a lime tree in blossom.

The women spend much of their time weaving baskets, which the natives use as "trunks," and which find a ready sale among the visitors to the island. A perfect basket is woven of split rattan or bamboo; to render it waterproof, it is covered with the leaves of the wild plantain or banana, and finally finished by a covering of closely-woven splints made from the ribs of the palm, which the natives call "yocong." The colors used are principally red and black, and are usually woven in some geometric pattern. These baskets are made in nests ranging in size from a tiny affair three inches square to the larger forms of three feet. They are light, strong and elastic, and, being made on the principle of the telescope grip, are very roomy. When traveling the Carib places all his belongings in one of these baskets, sticks his machete in his belt, and literally "takes up his bed and walks." All burdens are carried on their shoulders by a band passed around the forehead. At first sight this seems a hard and awkward method, but I have tried it myself, and found it much easier than carrying a load on the head, or strapped to the shoulders, knapsack fashion.

As hunters the Caribs are unexcelled. Possessed with all the cunning and endurance of his North American cousin, he has in addition infinite patience. For instance, I have known one of them to wait half a day to get a shot at a certain agouti, when by an hour's chase with his dogs he might have secured another. Still, as his mind was fixed on that particular one, no other would suit, and in the end he got him. These Indians are very superstitious, having a full belief in good and evil spirits, enchanted animals, "jumbies" and the like. Their belief in the last is very curious; according to them a jumbie is an invisible spirit, capable of taking possession of any animate object, under the guise of which they are enabled to do any amount of mischief. When the assumed form, animal or bird, is killed, then the jumbie temporarily loses its power. For this reason the Caribs, and negroes as well, always carry their guns at full cock after nightfall and look furtively at every strange-looking object; if the least suspicious, they shoot without warning and then take to their heels. On several occasions, while returning late from a hunting trip, I narrowly escaped being shot as a jumbie. Another of their beliefs is that people possessed with the power of witchcraft often visit their huts at night in the shape of insects for the purpose of overhearing their private matters. They therefore burn the wings of all insects that frequent their houses, with the belief that the witch will be found burnt the next day.

Although the Caribs profess the Catholic religion, and to all appearances are devout Christians, they yet worship their own gods, wear charms to ward off evil spirits and once a year hold a religious feast at which a child is killed and eaten. This last may seem improbable and many will say impossible. At first the officers of the English government denied that the practice was in vogue, but finally admitted that they knew such feasts were held, but to try and prevent it would only cause trouble and do no good. A Carib, who became much attached to me, described the ceremony in this wise. Once a year the people all retire to a spot in the forest selected by their "medicine" men; this spot is carefully cleared of all brush and undergrowth and a rude platform or altar is erected in the centre, where the people pray, sing and dance in their native costume (a breech cloth) for two days. At the end of this time a child of less than three years of age is killed and pieces given to each of the worshipers who are present, the remainder of the body is smoked and salted and set aside for the benefit of those who, for any good cause, were unable to attend the feast. The child sacrificed is always selected by the priests some months beforehand and is carefully kept and cared for by them.

The Caribs use poison but little, and they know nothing of the curare, which is so universally used by the South American tribes. They, however, prepare a powder from a small plant which causes intense swelling and fever when sprinkled on the skin, and if inhaled means certain death. As boatmen they are very expert. Their dug-out canoes are made from the trunk of the "gumie" tree and are generally about twenty feet long by three wide, round bottomed, and when in the hands of the Indians are very seaworthy. They are often decked and carry a small lug sail of matting or coarse cloth; a leeboard is used when tacking or sailing on the wind. In these canoes the Caribs will paddle through surf which would defy a lifeboat and venture out thirty or forty miles on the Atlantic.

THE LAKES OF THE JURA MOUNTAINS.

M Antoine Magnin has recently published in the *Revue générale de Botanique*, the results of four years' explorations among the lakes of the Jura Mountains. These are sixty-six in number, with two exceptions all of them situated on the southern face of the mountain axis. In altitude they range to 3780 feet (1152 metres), or to not more than one-half the elevation of the highest lakes of the Carpathian Mountains, but the great majority are situated below 3000 feet, and 20 occupy positions under 1300 feet. Only six of the lakes cover an area exceeding 100 hectares, and the greater number, 36, have only one-tenth of this dimension. The greatest depth determined is that of Lake Bourget, 475 feet; then follows Aiguebelette, with 232 feet, and 25 others whose average depth exceeds 30 metres (98 feet). The most striking fact connected with these lakes is the large number which occupy closed basins, without either visible inlets or outlets There are 25 of these whose water-supply is regulated by subterranean pipes and channels, such as are to be found in many other limestone regions of the earth.

The general color of the Jura waters is yellowish-green, in the greater number of cases falling between the series V and XI of the scale of Forel; the less deep lakes of the peaty tracts are brown in color. In general they are not distinguished for transparency, their sediments largely interfering with the penetration of light; in the lake of Amblé-on alone, seemingly, does this transparency extend to 35 feet—in summer time, at least—an insignificant depth as compared to the depth at which, under favorable conditions, objects are made discernible in the large Swiss lakes. Probably in the winter season, when the waters are less turbid through the interference to sedimental discharges, this depth is materially increased. All of the small lakes, and most of the larger ones, are completely frozen each year, those of the higher elevations being normally closed from the first of December until about the first of April, or through four months. A few remain open for most of the winter, and the Lake Bourget never freezes. In their chemical relations the waters are all calcareous, precipitating on an average about .162 gr. per litre, mainly carbonate of lime, to which traces of the salt of magnesium is superadded.

The vegetation that properly belongs to the lakes is comprised in forty-five distinct species of plants and fifteen well-marked varieties; with this number must also be included a certain number of forms, not strictly lacustrine, which grow on the peaty and boggy borders. Of the forty-five species, thirty are true flowering plants (phanerogams), of which the potamogetons number 18 distinct forms and the nympheas 6; the characeæ comprise 12 species and 5 varieties. Of the total number of species only 20 are so broadly distributed that they might be considered to constitute a basis for the flora of the lakes at large, and there are only five whose distribution takes in more than one-half of the lakes. The yellow lily (*Nuphar luteum*) is found in 57 lakes, the white lily (*Nymphea alba*) in 49; the common *Myriophyllum spicatum* belongs to 39. Nine species, embracing 3 potamogetons, 2 charas and a nitella, have thus far been found in single lakes only. There is not a single form which might be said to belong to the lakes exclusively—*i. e.*, is not found in the flowing waters or in the bogs. The macrophytes, or plants of visible form, extend downward to a depth of some 20–40 feet, where they are succeeded by the "abyssal" or microphytous flora. The pelagic, or free-surface flora, as in the open sea, is mainly constituted by the diatoms and confervoids.

THE GREAT (1894) EARTHQUAKE OF GREECE.

OF the many destructive earthquakes which have visited Greece during the last half century, few can compare in intensity with that which, in April of the past year, scattered desolation over the Locrian plain, annihilating many of the towns and hamlets of the Larymnian peninsula, and causing the deaths of hundreds of its inhabitants. An interesting study of this catastrophe, from which we borrow some of the details, is furnished to Petermann's *Mitteilungen* by Prof. Constantin Mitzopulos, of Athens.

The severest shocks were those of April 20th and April 27th, the former announcing itself without any premonitory tremors or rumblings, and distributing its waves over the entire kingdom, and seemingly on a northwest line hundreds of miles beyond, to the German coast and Great Britain. The duration in both cases was only a few seconds. A close study of the devastated region showed that the intensity of the destruction was in a measure determined by the underlying rock-formation, but not to the extent of permitting an *a priori* assumption of where the havoc would, and where it would not, fall. The alluvial region was most largely affected, but the limestone and chalk tracts responded indifferently to the moving waves. The towns of Proskyna and Malesina—the latter situated at an elevation of 850 feet above the sea—with 120 and 300 houses respectively, were completely annihilated, apparently not a single house remaining standing. All in all, it is estimated that fully 6000 houses were swept out of existence in the disturbed region. The shocks were painfully manifest in Athens, and besides threatening the Parthenon, they inflicted damage upon such well-constructed edifices as the University and the Mineralogical Museum. It is a remarkable fact that the columns of the temple of the Olympian Zeus, which rise in solitary grandeur 57 feet in height, should have remained unhurt, although they are said to have swayed to and fro like bending reeds. It is also a noteworthy fact that in the mines of Laurium, at a depth of 300 feet or more, the shocks, which were very severe at the surface, were not at all apparent.

The most interesting feature connected with these earthquakes was the formation of a long rift, some twelve miles or more in length, which extends from Almyra, over Atalanti, to the torrent of Karangiosi, and follows closely the line of contact of the soft alluvium with the harder rock of the country. Barely visible in places, elsewhere it opens out to a width of over a yard. Coincidently with the formation of this fissure, a strip of the borderland of Atalanti, measuring some six miles in length and an average of thirty feet in width, subsided beneath the sea, transforming the peninsula of Gaiduronisi into an island. It is believed that the island of Atalanti was itself formed in this way in the year 426 B. C.

A REMARKABLE FEATURE IN AFRICAN GEOGRAPHY.

TO Professor Suess, of Vienna, we owe the first demonstration that over large areas of the earth's surface the crust has been steadily breaking through, in distinct sections, in the direction of the earth's centre. These breakages form the basins of many of the larger seas and gulfs, such as the Mediterranean and the Gulf of Mexico, and their appendages ; or, as in the heart of continental regions, they may form linear troughs of greater or less length and width—the fundament of deep parallel-sided valleys. In the United States the Yosemite Valley seemingly represents such a subsided block or trough ; in the Eastern world, the Dead Sea and the valley of the Jordan are another illustration of the same structure In a recent number of the London *Geographical Journal*, Dr. J. W. Gregory, of the British Museum, who was latterly attached to an expedition for the exploration of the African lake-region, defines what is apparently the longest rift in the earth's crust, a parallel to which is, perhaps, to be found in the long lunar clefts which have so long puzzled astronomers. To use Dr. Gregory's own words :

In an examination of a map of Africa, one of the first points likely to be noticed is the number and size of its great lakes, the exploration of which has been the greatest stimulus to African travel since the discovery of the sources of the Nile and the course of the Congo. Anything beyond a most casual examination of the map shows that the lakes are all grouped in the eastern tropical region, and that they are here developed in two forms. There are those, such as the Nyanza and Lake Moero, which are round in shape and have low shores, and those which are long and narrow in shape and have high precipitous shores, such as Tanganyika, Nyassa, and Basso Narok (Lake Rudolf). Further examination, moreover, shows that the lakes are not distributed hap-hazard, but on a certain definite plan. The long ones are arranged in two lines, which pass one on either side of the Nyanza and meet at the north end of Basso Narok ; thence a line of lake-dotted lowland, in places below the level of the sea, runs up to the Red Sea. But the Red Sea itself presents exactly the same type of structure ; it is long and narrow, and excluding some strips of coast deposits has similar high, steep shores. From its northern end the Gulf of Akaba leads to another valley, margined by deep, high walls, and traveling along it we come to another lake situated in a deep depression, and a river in a long narrow valley. These are the Dead Sea and Jordan Valley, which continue the type of structure of the east African lake chain, till it ends off in the deserts of northern Syria.

From Lebanon, then, almost to the Cape there runs a deep and comparatively narrow valley, margined by almost vertical sides, and occupied either by the sea, by salt steppes and old lake basins, and by a series of over twenty lakes, of which only one has an outlet to the sea. This is a condition of things absolutely unlike anything else on the surface of the earth. It is, therefore, only natural to inquire whether this great valley consists merely of a series of independent basins formed by depression or erosion, the linear arrangement of which is but an accident, or whether it is all due to a common cause, which formed a great earth crack or depression at some comparatively recent period of the earth's history. All along this valley the natives have legends of great changes in the structure of the country. The Arabs tell us

A CORNER OF SPAIN.—IN THE GARDEN OF THE ALHAMBRA.

that the Red Sea is simply water that did not dry up after Noah's deluge; the Somalis say that when their ancestors crossed from Arabia to Africa there was a land connection across the straits of Babel-Mandeb. The natives of Ujiji have a folk-lore that goes back to the time when the lake of Tanganyika was not; while in the extreme north, there are the better, or rather more widely known, but less definite legends of the destruction of Sodom and Gomorrah.

It may be objected, Dr. Gregory continues, that if a valley such as the one suggested could have been thus formed, why are there no others of a corresponding size and arrangement? Many such valleys are known in America, where, *e. g.*, the Yosemite can only be explained as due to the subsidence of the orographic block that formed the floor of the valley. These cases, however, are much shorter. The nearest approach in size can probably be found on the moon, whose cliffs or rills no doubt represent long steeply-walled valleys, and present to us much the same aspect as this east African valley would do any inhabitants in our satellite.

The position of this long linear Afro-Asiatic trough was first indicated by Professor Suess, but it was left to Dr. Gregory to demonstrate its existence, at least in part. This investigator was actually able to trace a long parallel-sided and steeply-walled valley, of perhaps twenty to twenty-five miles width, extending southward from the great Nyanza to beyond the first parallel of south latitude, or over an extent of some 150 miles or more. Over much of this extent the bounding walls "are so precipitous that not even the most expert of cragsmen could scale them;" sheer precipices are indicated with elevations of 800 and 1900 feet. Over the flat valley which is thus inclosed by straight walls and whose elevation gradually declines northward from 6300 to 3300 feet, are scattered a number of lakes (and others now dry)—the largest of which is the well-known Lake Baringo—and several extinct volcanic cones, with associated lava-streams. It is this remarkable structure which, in a more or less masked form, is thought to continue northward through the African continent into Asia—a feature of most unique development and extraordinary persistency. It seems not impossible that the areas of greatest earthquake energy in Greece, the Balkan Peninsula and Central Europe to-day are located on lines of ramification from this fracture of the earth's crust.

OUR ILLUSTRATIONS.

PRIMITIVE BULL-WELL IN YUCATAN.

TO those who are accustomed to regard Yucatan as a forest or jungle-covered country, inhabited mainly by tribes of wild Indians and scores of wild beasts, the picture of life which we here present will come as a pleasant awakening to the conditions which really exist there. A peace-loving people in the main, the Mayas, they cultivate the soil, gather in the harvest of the chase, and cheerfully attend to those not very burdensome duties which the processes of nature in the tropics require of them. Honest (except in the cities) to a marked degree, painstaking in their endeavors to render good service where service is asked of them, they are at once the friend of the stranger and his servant. It is true that there are in the interior of the country numbers of so-called savage Mayas, but, while savage they may be, they have only become so as insurgents under a government whose authority they decline to recognize; of Mexico and the Mexicans they are not friends, nor of such as associate with these people or come from their domain. Otherwise, the revolted Mayas are like the other Mayas in general habit, sentiment, and intelligence.

In our illustration of the bull-well of Tekantó—a hamlet of northern Yucatan where the most enduring and costly of "Mexican" hammocks are netted by gentle hands from the Sisal aloe or hennequen (*Agave Sisalensis*)—the simple costume of these people, shirts and trousers, reads the history of their simple wants; to many, indeed, this raiment is already a burden, and they dispense with a large part of it. Mr. David A. Wells, in his interesting work, "A Study of Mexico," draws a Biblical picture of the scenes that present themselves in our sister republic, so truly Oriental in their composition are some of their most distinctive features. There are probably not a few who will see in our illustration an emphasis of this suggestion—the distinctively eastern aspect which the *ensemble* presents, more to the mind a picture of Asiatic husbandry than one of primitive Americanism.

IN THE GARDEN OF THE ALHAMBRA.—GRANADA.

Our readers need no introduction to the Alhambra, the structure that perhaps of all else most invites the stranger to sunny Spain.

Placed at an elevation of 2000–3000 feet, the town to which it belongs combs the cool breezes of the uplands—too cool, at times, even in the summer—and affords a bracing change from the heat of the plains. In many ways it is well fit for a health resort, and perhaps more comfort can be obtained here than at any other Spanish town, excepting Madrid—which is not saying very much. A prominent medical man, well acquainted personally with most parts of the globe, describes this as "the most delightful spot in the world," and if this opinion is not, perhaps, absolutely shared by all who visit Granada, they certainly will join in sentiment with another writer, who states that "the charms both of nature and of art, which have made this a shrine of tourist devotion, need hardly be expatiated on." By many the view from the tower of the Alhambra, which overlooks the snow-crest of the Sierra Nevada, is considered one of the finest in the whole of Europe, perhaps even surpassing the somewhat similar view, over the frosted Alps, from the Cathedral of Milan.—Our illustration is taken from the garden of the Alhambra—an artistic composition breathing the warmth of its native sunshine.

AN ANCIENT FORESTER.

Of the great forest which covered most of the Yucatan peninsula at the time of the Spanish invasion, and which was ruthlessly destroyed by the conquerors, in part, doubtless, to facilitate their progress through it, and, perhaps, as some historians maintain, to make the new country appear as bleak and barren as old Spain, only fragments now remain. A considerable part of the "closed" interior is so-called jungle—for which a more appropriate name would be scrub—in which comparatively few traces of the primitive growth remain. Here and there, however, the eye rests pleasantly upon the umbrageous form of some gigantic forester, whose broadly-spreading arms offer protection to the world of new life that has grown around it. The giant red-wood (*Eriodendron*), the silk-cotton tree (*Ceiba*), the rubber, and fig, with many others, remain as exiles from the history of the past; in the scrub, along the roadways, about the street corners of the towns and villages, they appear singly, or, at most, in limited groups—a pleasing contrast to the rather stunted vegetation which otherwise prevails. The pich-tree of our illustration is the *Inga xylocarpa* of botanists, a plant belonging to the Leguminosæ, or order to which the mimosas, locusts, and acacias also belong. Some idea of its size can be obtained from the figure of the Yucatecan sitting at its base. Its most marked feature is the covering of air-plants (*epiphytes*), which appear in stellate masses over the principal branches, giving to the tree a bristly aspect. It will be noticed, too, that the tree is leafless; at the time the picture was taken, in the month of March, the southern winter prevailed, and if not to the extent of giving frost, sufficient to cause physiological decay and the dropping of the leaves. By far the greater number of the trees of Yucatan, even though they be in flower or fruit, are stripped of their leaves at this period of the year. The exquisitely formed tree which is represented in our illustration stands on the highroad connecting Merida with Valladolid, not far from the well or çenote of Tunkasz.

THE ARGENTIÈRE GLACIER.

The Argentière Glacier, one of the many ice-sheets which descend from the colossus of the Mont Blanc, exhibits to an unusual degree the special features of a glacial landscape. Zig-zagging about the valley which it has itself in part fashioned, the huge ice travels to the front much in the aspect of a surging river, and with full appropriateness, in common with other similar "rivers," receives the designation of *mer de glace*. Its central portion is cut up by variously rifted crevasses, resulting in the main from the irregular movements of the ice over an uneven bed, and in the upper part, over a steeper slope, the ice has crowded itself into a cataract. On the right of the line of movement, wedged in between the rock-walls and the glacier, but resting in part on the ice, a vast heap of rubble—rock débris, boulders and sands—has accumulated, forming what geologists technically term a moraine. Some of this moraine is gouged out by the ice itself, but the greater part is merely a downfall from the mountain slopes, which is gathered up on the ice and moved along with it. A somewhat similar mass of débris, where it has precipitated itself over the ice, bounds the front wall of the glacier, and thus geologists distinguish between "terminal" and "lateral" moraines. The small but picturesquely-located hamlet of Argentière, which is seen in the foreground of our illustration, is built upon a portion of the lateral moraine. The snow-cap or ice-field which feeds the glacier does not appear to view, being lost in the clouds which hover over the crest of the mountains.

STUDIES OF THE EARTH'S FEATURES.

I.

GLACIERS.

PERHAPS the simplest definition that can be given of a glacier is that it is a sheet of ice, very often river-like in appearance, which moves down a mountain slope mainly through the force of gravity. This conception naturally takes in small masses of ice and large ones—consequently, small glaciers and large ones. But whence comes the ice?

Every one who is at all familiar with the face of the earth knows that in nearly all parts of it, whether it be in the eastern hemisphere or in the western, in the polar regions or about the equator, there are some mountains that rise so high that their upper parts are covered by perpetual snow; the summer heat is there not sufficiently great to melt all the snow that has fallen; consequently, there is a residual accumulation—the everlasting snow-cap. It is in this accumulation that the ice of most glaciers has its origin. In the heated tropical regions this excess of snow-fall naturally lies high; consequently, glaciers form there only at great elevations above the sea (of 16,000 feet or more); in the polar regions, where the year's heat has been so materially reduced, glaciers may form very low, down to a level of some 1600 feet; and, naturally, in the intermediate regions they will form at intermediate heights, depending as to how far north or south of the equator they may be located.

In wandering among mountain tops which rise above this line of perpetual snow, we observe that while many of the summits are completely shrouded in their white mantles, others, even if they be more lofty, are devoid of this covering. The rock-slopes are in their cases too steep to hold the snow, which is, perhaps, swept off to lower levels; the crags, therefore, appear naked. On such mountains no glaciers will be formed, none, at least, of any magnitude. Where the slopes are more gentle the landscape is an all-winter one, whether the picture be taken in the month of July or in December. The eye rests upon evenly rounded domes, buried beneath possibly 200–300 feet, or more, of snow, some of it shifting and flying like the sands of a desert, elsewhere crisp and hard like our thawed winter snows which have gone through the process of refreezing. In the natural hollows or basins between the different mountain peaks, wherein the avalanches pour their own fleecy products, and to which the whirling winds contribute not a little in the distribution of material, the snow will lie most heavily; to such special sources of supply we trace many of the largest glaciers. At no portion of the northern hemisphere, seemingly, does the snow-line descend to the actual level of the sea—a condition that has not yet received an absolutely satisfactory explanation, but which appears to be, in part at least, due to the comparative dryness of the atmosphere. And so it is that in northern Siberia (with an annual temperature of only +3°F.) the mountains are for several months of the year free of snow up to an elevation of 2000 feet. This is also true of northern Greenland, and of parts of Grinnell Land even beyond the 83d parallel of latitude. In the last-named region, indeed, it is not infrequent to see mountains of full 3000 feet elevation rising with scarcely more than a patch of snow on them.

THE MAKING OF A GLACIER.—It can very naturally be asked, Since more snow accumulates on a given mountain than is carried away through melting, what becomes of all this superaccumulation? Does it pile up higher and higher, constantly increasing the height of the mountain, or is there some other method besides melting by which it is either partially or completely removed? We know, as a matter of fact, that the height of a mountain is in no material way influenced by the amount of snow-deposit, no matter to what extent such peak may rise into the area of perpetual snow; consequently, some agency other than melting is instrumental in removing the continuously accumulating mass. It is a familiar experience that if we steadily compress a handful of freshly-fallen snow, we eventually form an ice-ball, the superficial and cubical area of which will be considerably less than that of the original handful of snow. A double process has been involved in the making of this ice-ball; first, the melting of the snow-particles, which was in part brought about by the heat of the hand, and partly by the lowering of the freezing-point through pressure; and secondly, the freezing together of the particles (on the removal of the pressure) into a solid mass. The peculiar property which ice-particles or fragments possess of uniting to one another at about the temperature of melting is known as "regelation."

Now, something closely analagous to that which takes place in the making of an ice-ball is repeated on the loftier mountain summits. The gradually accumulating snow-masses become, through the alternate processes of melting, freezing and pressing, more and more compacted and transformed, until in the deeper or bottom layers they consist almost wholly of pure ice. It is this ice, still partially covered by snow, which, when forced out from its collecting-basin through pressure, gravity, and molecular expansion, constitutes a glacier. Slowly creeping down the side of a mountain, this moving mass of ice, which may be miles in length and hundreds of feet in thickness, overcomes in one way or another all obstacles in its path, until, finally reaching a zone of warm temperature, where the sun's rays melt off at least as much of the ice as is brought down, it abruptly terminates; or, as is the case with many of the far northern and southern glaciers, they discharge into the sea, and are there broken up into freely swimming ice-bergs.

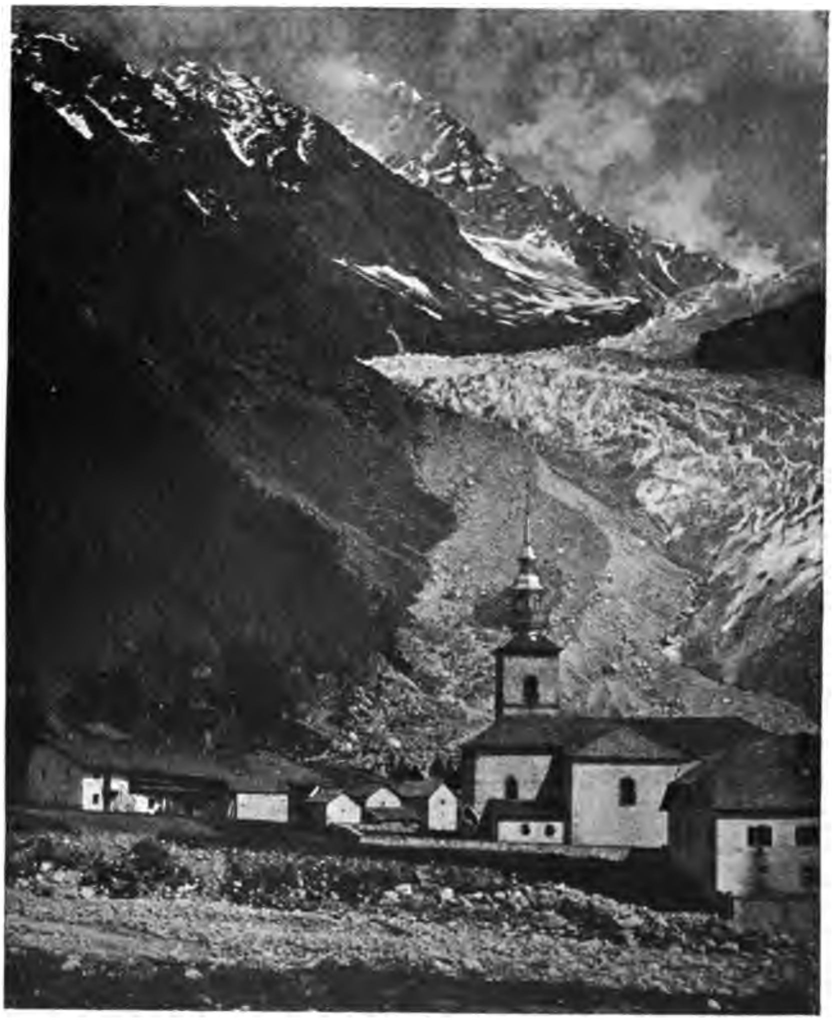
The upper accumulation basin of a glacier is known as "firn" or névé, and is usually in the form of a gently undulating hollow spread out between the slopes of a number of surrounding peaks. In most cases, perhaps, its area is several times that of the glacier or glaciers which it supplies. A glacier need not necessarily have a firn, for it may arise on the slope of the mountain directly from the steeply inclined snow-beds. In the Alps, at an elevation of 6500–8000 feet, where seemingly the snow-fall for the year is heaviest, the year's deposit is from 50 to 70 feet in thickness; compacted into firn ice, this quantity would make a layer calculated to be about eight feet thick. Above 8000 feet the snow-fall gradually diminishes, and at 11,000–12,000 feet it is reduced to perhaps not over ten or twelve feet At the present day, the snow-cap on many of the Alpine summits (or upper parts) is fully 200–300 feet thick, as has been determined by actual measurements in exposed sections. On the Mont Blanc it is assumed to be about 150 feet, on the Eiger of 200 feet, on the Jungfrau of nearly 300 feet, and on the Piz Bernina of 350 feet; but the thickness varies considerably in different years.

THE CONSTRUCTION OF GLACIAL ICE.—In its alternate meltings and freezings the upper snow passes into a condition of small particles or vesicles, of the size of the roe of fish, or of that of hazel-nuts; this *firn*, as it is often called, by further icy modification is converted into the granular *firn*- or *névé*-ice, and then into the compact or true glacial ice. Even this last, despite its apparent homogeneity, can frequently be found to be divided up into polyhedral masses (*Gletscherkorn*), in places several inches in diameter, which, if their optical characters have been properly interpreted, are a form of ice-crystal. The *firn* and *firn*-ice appear grayish-white or gray, but the compact lower ice has a distinct blue tint, which may, however, be visible only in thick masses. The compact ice is also usually transversely ribboned or banded, thin laminæ of blue ice alternating with similar white laminæ—a construction which appears to have been brought about as the result of mechanical pressures—the strains of compression to which the glacier is subjected in the course of its motion.

(*To be Continued.*)

NOTES ON MOUNTAINS AND MOUNTAINEERING.

SCIENTIFIC EXPEDITION TO MONTE ROSA.—Prof. Piero Giacosa, of Turin, who, with Dr. L. Scofone, passed a considerable part of the past summer in investigating the snows and waters of the Monte Rosa *massif*, with a view of determining their biological and chemical impurities, writes to the editor of *Nature*, under date of October 28th, as follows: It will perhaps interest your readers to know that while the water of the springs, streams, and lakes was constantly free from ammonia, there was found a tolerable quantity of it in the snow collected on the summit of the Punta Guifetti or Signal Kuppe, one of the loftiest peaks in the Monte Rosa range, measuring 4539 metres. The ice of the Lys Glacier, dug out from the depths of a huge crevasse, also contained ammonia; nitrites and nitrates were absent in every case. Accordingly, we found that the water of the Indren stream, during a very hot day, when the melting of the ice was considerable, contained traces of ammonia. We also found that the ice and snow collected on the various peaks, passes, and snow-fields of the Monte Rosa range contained a few germs. The number of the species whose germs can thrive at those heights is certainly not large; the usual forms, living in decayed matter and in the intestines, cannot probably endure the condition of temperature, pressure and light of the place.—The position occupied by these investigators was the Alp of



THE ARGENTIÈRE GLACIER.

Lavez, in the valley of Gressoney (at an elevation of 8000 feet), near the locality where the brothers Schlagintweit, in 1851, passed many days in their explorations of Monte Rosa.

DISTRESS SIGNALS ON MOUNTAINS.—The committee of the (English) Alpine Club, consisting of Messrs. Clinton Dent, E. D Law, F. O. Schuster and H. G. Willink, which was appointed at the close of 1892 to suggest a universal code of distress signals and answers for adoption by all the Alpine clubs of Europe, reports that in their opinion no forms of signal can be of material service the execution or efficacy of which is in a great way dependent upon, or hampered by, special conditions of the atmosphere, interfering with direct transmission of light or sound. They therefore recommend the system of intermissions, or the repetition at regular intervals of light or sound effects. In whatever way, or by whatever means, an optical effect—waving objects, light-flashes, color display, etc.—or the sound of any instrument, tone or voice, is transmitted at regular intervals six times ("points") per minute, it is to be considered a signal of distress. These transmissions, so far as is possible, are to be repeated until an answer is received, such answer being similarly constituted, except in so far as it repeats itself only three times per minute instead of six. For the signaling of details the committee recommends the adoption of the Morse telegraphic alphabet, or some modification of it, similar in kind to the system that is in use in the English army.

HONORS TO AND THROUGH ALPINE PEAKS.—Among the various methods that have been suggested for honoring and perpetuating the name of the great "Iron Chancellor" of Germany, Prince Bismarck, is one that will, doubtless, meet with considerable favor on the part of the German people, if not, perhaps, from the official or governing circles of the sovereign capital itself. It is to the effect of erecting on the summit of the Zug-Spitze, of the Bavarian Alps, the loftiest elevation of the German Empire (9700 feet), a monument made from rocks obtained from all the different States of the Empire, and dedicating it to the man who was so largely instrumental in making "United Germany." It has even been suggested to give the name of Bismarck to the highest point of the mountain, while retaining the old name, so dear to the kindly folk of Bavaria, for the great mass of the mountain.—The Cima di Brenta (10,350), the second highest summit of the Brenta group of mountains, will hereafter be known as the Kaiser Franz-Josef Spitze, the renaming having been made in honor of the Emperor of Austria. Just why this change is made at this time is not made clear.

ALPINE DISASTERS.—The various Alpine journals indicate a disagreeably large number of mountain accidents as having occurred during the past summer and autumn. Accidents with fatal results are reported, among others, for the mountains of Pontresina, Ragatz, Gastein, the Zillerthal, Monte Salvatore, the Zinal-Rothhorn, the Marmolata, and the Pilatus. The disaster (September 8th) of the Marmolata (Dolomites)—the first that is recorded, although the mountain is ascended fifty times or more every year—was brought about by the sliding of the summit snow-cap, which precipitated four members of an ascending party, two of whom lost their lives. The uniting rope was cut in the descent, and it is hard to say in this case whether to its parting is due the fatal result or the saving of the two more fortunate members of the party who were left behind. The accident on the Zinal-Rothhorn (September 20th) was brought about by the dislodgment of a rock, which swept off a party making the ascent of the mountain under the lead of the well-known guide, J. Maria Biner, latterly the Syndic of Zermatt. In this instance, too, the rope was cut, and the unfortunate Biner was hurled below and killed. It is manifest from these and similar disasters that if the Alpine rope is to be depended upon as a piece of life-saving apparatus, it must be selected with a higher ideal of strength than is customary, or be constructed on a very different pattern from the present one. It is singular that there should be two fatal accidents reported from the Carpathian Mountains, both of them associated with the Schlagendorfer-Spitze of the Tátra, a mountain that is neither difficult of ascent nor one showing specially precipitous faces. But the lesson of the Alps shows that accidents belong to the lower summits as well as to the higher ones, to the feasible mountains as well as to those that are more difficult of ascent.

NEW ROAD OVER THE GRIMSEL.—Those who know the wonderful region of the Grimsel from the old mountain-path will, perhaps, look with disfavor upon the project of opening it up to wagon tourists. Switzerland of old is undergoing a transformation, and the famous passes, with their defiles, precipices, and narrow ways, allowing passage for animals in single file only, will before long be merely an inheritance of memory. The Grimsel road has been completed from the Rhone Glacier to the Bernese frontier and is in course of construction to the imposing Handeck Falls, where a platform will be erected for the benefit of tourists, and a descending stairway built to the base of the gorge. Much damage has already been caused to the new roadway through undermining by torrential rains and landsliding. Similar damage has also been inflicted upon the newly-opened *Klausenstrasse.*

THE MEMBERSHIP OF ALPINE CLUBS.—The very great interest that is to-day taken in mountain-work is shown by the membership of the different associations whose appeal is made directly to this topic. In a recent memoir prepared by M. Budden upon the development of Alpine clubs, it would seem that the major associations alone, *i. e.*, the well recognized clubs of England, Germany, France, Austria, Switzerland and Italy, number upwards of 53,000 members. To this number M. Budden would add a further 65,000 as representing the secondary associations, making a grand total of nearly 120,000 members.

HINTS TO TRAVELERS AND NOTES ON APPLIANCES OF TRAVEL.

THE MATTER OF CLOTHING.—At a recent conference of the Swiss Alpine Club, Herr L. Weissenbach made an interesting communication on "appropriate" clothing, and drew the following conclusions: Clothing, in order to be warm, should be, first, comparatively loose; secondly, it should be applied in a number of layers to the body, separating poorly-conducting air-spaces; thirdly, it should be ample in its cut, and closable at three or four parts of the body—neck, waist, and ankles; and fourthly, it should be either blue or black in color. Skin gloves and tight boots are always cold; the warmest gloves are those provided with fur in the inside, or wool-knitted (but never closely so). The stockings are naturally of wool, but to those who are inconvenienced by this material, the interposition of a light cotton sock will come agreeable.

In warm regions hair and beard should be cut short. For head covering an umbrageous light, white-colored hat is recommended, and by preference the English pith-helmet. The clothing should be loosely-flowing, of white material, and so arranged as to permit of freely-moving currents of air, designed to remove the products of evaporation. For Alpinists an entirely wool clothing is recommended, with Jæger underwear, pantaloons lined inside with wool, and hunting vest. The clothing should be so adjusted as to readily open and close for the regulation of air currents [a detail which was so successfully applied by Mr. Peary in the arrangement, for heat and cold, of his fur garments]. For glacial and ice regions, where cold winds and much humidity prevail, the proper greasing of shoe-leather is a necessity; leggings are a convenience in snow marches, and should again be selected of wool. The rubber coat is useful only as a protector against wet or moisture, and the cravat is absolutely useless.

Herr Weissenbach gives, on the authority of Dr. Frœlich, the following comparative capacities to absorb the solar rays by different materials, the unit of 100 being cotton: Linen, 98; flannel, 102; silk, 108. As to color, Pettenkoffer gives the following as the result of his experiments: White shirting, 100; shirting of light yellow, 102; dark yellow, 140; light green, 155; dark green, 158; red, 165; light blue, 198; black, 208. Smooth stuffs—cottons, linens, silks—irritate the skin less than those with a rough body, like wool, which, however, has the advantage of not readily adhering to the surface. At the same time wool may become disagreeably irritating through its fibre "clawlets."

NOTES.

THE PARTHENON OF GREECE AND THE RECENT EARTHQUAKE.—The earthquakes which last spring visited with terrific effect many parts of Greece have done much to render unstable many of the supposedly imperishable monuments of that land. The great Parthenon itself has been shaken to its foundations, and a committee appointed to examine into the extent of the damage which this beautiful temple has suffered, reports that the building has been seriously injured, and that immediate steps must be taken looking to its preservation from absolute destruction. The friends of all that is holy in monumental remains will be pleased to learn that the Archæological

Society of Athens has taken upon itself the burden of looking after this masterpiece of ancient architectural art, and has voted for its defense an unlimited credit.

TRAVELS ON AN OCEAN CURRENT.—We borrow from the English periodical *Nature* the following very interesting facts bearing upon the geography of currents: Mr. H. C. Russell has sent us an account of the travels of three bottle-papers used for determining ocean currents. One was thrown into the sea near the Crozet Islands in March, 1893, and was found in September, 1894, between Cape Banks and Cape Northumberland. The mean daily rate of this appears to have been nearly eight miles. Two other papers traveled over much the same course on the south coast of Australia, at mean rates of six and nine miles a day. The interesting point is that three current-papers should pass over more or less the same track, and agree so well as to the rate of the current. The paper that made only six miles a day was hampered with a heavy frame of wood, which had been put round it as a protection when it should reach the coast.

A PROJECTED RAILROAD IN ICELAND.—It would seem that this comparatively little-known island, which, as yet, does not boast of a single road or highway, is to have a railroad. This "apparition" is planned to unite the capital, Reykjavik, with Rangavalla-Syssel, and to be in association with a semi-monthly or monthly line of steamers from England. Advices from Copenhagen state that the Iceland Althing has voted for each enterprise a yearly subvention of 50,000 krone, to be continued for thirty years.

THE GREAT HIMALAYAN MOUNTAIN SLIDE.—One of the most prodigious dynamic operations of the earth's surface, whose actuality was made visible to the human eye, was the great mountain slide which latterly occurred in the outer Himalaya, in the valley or gorge of Birahi Ganga, in the district of Gurhwal, and dammed up the stream that flows through that gorge. The displacement was from a mountain that rises some 4500 feet above the valley, over which it guards the approach, and nearly 10,000 feet above the sea. The liberated material formed a dam 885 feet in height and nearly 2000 feet in width, behind which accumulated a lake two and three-quarters miles in length and a mile and a half in width at its widest part, with a greatest depth of nearly 600 feet. So perfectly had the English officials guarded all measures for safety that when this gigantic wall broke and liberated the pent-up waters, not a life was lost in the region.

THE MACDONNELL RANGE EXPEDITION.—The recently returned Macdonnell Range Expedition, under the leadership of Mr. W. A. Horn, which penetrated into the heart of the Australian Continent very nearly to the 23d parallel of latitude (S. Lat. 23° 20′), reports interesting discoveries in nearly all departments of science, especially in the domains of zoology and ethnology. Several additions to the Australian fauna, both living and extinct, were made, and a number of rare tyes, including among them the interesting Alexandra parakeet, were collected. Four hundred species of plants were determined. The most interesting geographical feature noted appears to be Ayers Rock, in south latitude 25° 21′ (E. Long. 131° 14′). a vast monolith measuring the better part of two miles in length and one mile in width (with a height of 1080 feet?).

COMPLETION OF THE TEHUANTEPEC INTEROCEANIC RAILROAD.—The railroad which has for some time been in operation between Coatzacoalcos, on the Gulf of Campeachy, and Suchil, in the interior of the Isthmus of Tehuantepec, has been completed to Tehuantepec, on the Pacific Coast, and the two oceans are thus united in Mexican territory. The opening of the railroad took place on September 11th. The length of the line is 197 English miles, and the duration of transit ten hours.

NEW SWARMS OF LOCUSTS.—In a communication made to the Entomological Society of London, at its meeting of October 17th, Mr. J. Y. Johnson, of Funchal, Madeira, transmitted to the Society the interesting information that the islands had been subject to a visitation of locusts, of the same species (*Decticus albifrons*) which composed the vast swarms of November, 1844, to which Mr. Darwin, in his "Origin of Species," makes reference. The communication contains the further interesting fact that these insects had not appeared on the islands, previous to August of the past year, since the visitation of 1844, a half century ago.—At the same meeting, Captain Montgomery, a justice of the peace of Mid-Illovo, Natal, transmitted the information that vast flights of locusts, extending over three miles in length, had visited his district of the Natal colony on August 31st last, following forty-four years after the exceptional invasion of 1850.

The Lightning of Old and of To-Day.—To those who still doubt that the introduction of electricity into various industries, and the modifications of the earth's surface and conditions through man's agency—in the direction of deforestation, drainage, coal burning, etc.—have no influence upon the electrical discharges of the atmosphere, the report of the Director of the Statistical Office of Berlin published in *Himmel und Erde*, will come as a rude shock. The increase of damage by lightning is unmistakable, as a result both of an increase in the frequency of the lightning stroke and of its intensity. Professor von Bezold years ago pointed out this condition for Bavaria, showing that the average yearly number of fires caused by lightning amounted to 32 between the years 1833 and 1843, to 52 from 1844 to 1865, to 103 from 1866 to 1879, and to 132 between 1880 and 1882. While in the year 1855 134 persons were struck by lightning—73 with fatal result—the number was increased thirty years later to 189, of which the fatal cases rose to the astonishingly high figure of 161.

Leprosy in Iceland.—Herr Ehlers, a Danish physician who has been charged with the examination of the sanitary condition of Iceland, more particularly with regard to the condition of leprosy existing there, finds this loathsome disease to be more broadly developed than official accounts had represented. He found 141 persons suffering from it, in place of the forty-two of the official documents, and concludes that the disease is spreading.

Disappearance of Falcon Island.—Geographers, no less than navigators, will learn with interest of the disappearance of this diminutive oceanic island of the South Pacific (S. Lat. 20° 19', W. Long. 175° 21' 30"), which has been in existence since October, 1885, when it was upheaved by volcanic forces. At that time it measured a mile and a quarter in length and somewhat more than a mile in greatest width, covering an area estimated at 232 hectares When visited by the schooner *Ysabel* in June of the past year only a low reef of black rock remained. Doubtless, the island has been steadily subsiding into the void caused by its own making.

Disasters to Expeditions.—The German scientific expedition to Kilima'njaro, under the command of MM. Lent and Kretschmar, respectively botanist and zoologist to the expedition, has met with a tragic termination in the death of its leaders. They and a portion of their escort, according to seemingly reliable accounts, were massacred in an encounter with some of the warlike people with whom they came in contact. An equally unfortunate fate has overtaken the French explorer Dutreuil de Rhins, who was murdered on June 5th last, near Sinin, in Tibet, and his body thrown into the Tung-Tien River. He had crossed Turkestan, the Pamir, and a portion of High Tibet, when he came to a disastrous conflict with a tribe of Tibetan "redcaps."

Amsterdam Exposition.—It is announced that an international exposition will be held at Amsterdam from May until November of the present year. Among its sixteen classes will be comprised architecture, transportation, manufactures, economic products, fisheries, hygiene, illumination, heating, geography, life-saving service, gardens, etc. Following closely upon the great exposition of Chicago and the less pretentious one of Antwerp, with an exposition announced for Rome, and another for Paris in 1900, it would seem as if the energies of the world were more largely directed toward exhibiting its progress than to progress itself.

Ravages of Wild Beasts in India.—Despite all the effort that is being made to exterminate the wild animals of India, or at least to lessen their depredations, it would seem that, year by year, their dreadful work increases. According to the recently published statistical report for 1893, 18,540 human lives were sacrificed to their rapacity or venom, and upwards of 90,000 head of cattle. Of the human sacrifices, by far the greater number are associated with the venom of serpents, the natives making little effort to protect themselves, and penetrating even into the jungle without covering to their feet. Following the serpents are the tigers, whose work is represented by approximately a thousand human lives and 21,000 cattle; the leopards are responsible for the deaths of 291 natives, the wolves for 175, and the bears for 121. The elephants and hyenas have a smaller number of counts on their consciences. Mainly as a result of the large rewards offered by the Indian Government for the removal of the dangerous animals, the year's work of extermination is represented by the killing of 117,120 serpents and 15,309 quadrupeds, among the latter being 1267 tigers and 4088 leopards.

Traveler's Directory.

. . . Winter Resorts and How to Reach Them . . .

Algiers. Reached by steamers from New York (Hamburg-American and North-German Lloyd Companies) in 10 days. Sailings in winter every two or three weeks.

Alexandria (Egypt). By steamers from New York (Hamburg-American Co.) in 14 days. Special winter excursion (also by French Mail Line).

Athens (See **Mediterranean**).

Azores. By steamers (in the winter season) from New York (Insular Navigation Co., Linha de Vapores Portuguezes, Hamburg-American Co.) in from 6–8 days Sailing almost weekly, but somewhat irregular. Passage, $60.

Barbadoes. By steamer from New York (Booth Steamship Co., Quebec Steamship Co.) semi-monthly, or oftener. Passage, $50; excursion, $80.

Bahamas. By steamers from New York (New York & Cuba Mail Steamship Co., Bahamas Steamship Co.) weekly, or oftener. Passage to Nassau, $40; excursion, $70.

Bermuda. By steamer from New York (Quebec Steamship Co.) in 50–52 hours, weekly. Passage, $30; excursion, $50.

Brazil (Pernambuco, Bahia, Pará, Rio). By steamers from New York (United States and Brazil, Red Cross, Lamport and Holt Lines, Booth Steamship Co.) semi-monthly, tri-weekly and monthly. Passage to Pará, $90; Pernambuco, $125.

Central America (Belize, Truxillo, Greytown). By steamers from New York and Brooklyn (Central American Steamship Line, Merchants' Line) tri-weekly, or oftener. Passage to Greytown, $70; excursion, $130

By steamer from New Orleans (Morgan Steamship Co.) every ten days for Bluefields, Nicaragua.

China (See Japan). By steamers from San Francisco and Vancouver (Pacific and Occidental and Oriental Steamship Cos., Canadian Pacific Steamship Co.).

Corsica (Ajaccio). By steamer of the Compagnie Transatlantique, in 14 hours, from Marseilles.

Cuba. By steamers from New York (New York and Cuba Mail Steamship Co., Compañía Transatlantica Española) in 6–8 days; weekly or oftener. Passage to Havana, $35; excursion, $60.

By steamer from Tampa, Fla. (Plant Steamship Line), in two days; three times per week.

Colon (Panama). By steamer from New York (Columbian Line) every ten days.

Egypt (See Alexandria) By steamer from Brindisi (Peninsular and Oriental Steamship Co.); by steamer from Genoa (Florio-Rubatino Line).

Florida (Fernandina, Jacksonville). By steamer from New York (Mallory Steamship Co., Clyde Line) three times per week. Passage to Fernandina, $21; excursion, $37.40. Jacksonville, $25; excursion, $43.30.

By steamer from New York (Ocean Steamship Co.) for Savannah, connecting with express trains for Jacksonville.

Guiana (Demerara, Surinam). By steamer from Brooklyn (Royal Dutch West India Mail Line) weekly. Passage to Demerara, $90; Surinam, $100.

Havana (See **Cuba**).

Hayti, San Domingo and Jamaica. By steamer from New York and Brooklyn (Atlas, Clyde and Royal Dutch West India Mail Lines) weekly or oftener, in 6–8 days. Passage to Kingston, $50; excursion, $90; Port-au-Prince, $60; Trinidad, $90.

Honolulu (See **Sandwich Islands**).

Jamaica (See **Hayti**).

Japan. By steamer, about every ten days, from San Francisco (Pacific and Occidental and Oriental Steamship Cos.); about every three or four weeks from Vancouver (Canadian Pacific Steamship Co.), in connection with the Canadian Pacific Railway—17 days from New York.

Key West. By steamer, weekly, from New York (Mallory Line). Passage, $40; excursion, $70.

Madeira. By steamer from the Azores. Passage, $15.

Malta (See **Mediterranean**).

Mexico. By steamers from New York (New York and Cuba Steamship Co.) in ten days; weekly. Passage to Vera Cruz, $55; excursion, $100. City of Mexico, $60; excursion, $110.

By rail, *via* New Orleans or St. Louis, in four days from New York. Excursion tickets to the City of Mexico about $120.

Mediterranean (Gibraltar, Algiers, Naples, Genoa). By steamers from New York (combined service of the Hamburg-American and North German Lloyd Lines) every week or two weeks during the winter. Anchor Line, special winter excursion (Gibraltar, Barcelona, Marseilles, Corsica, Palermo, Alexandria, Athens, Malta, Tunis, etc.). By French Mail Line, from New York. Also by Hamburg-American Line.

Martinique (See **West Indies, Lesser**).

Nassau (See **Bahamas**).

New Orleans. By steamers from New York (Cromwell Steamship Co., Southern Pacific Co.) semi weekly and weekly. Passage, $35; excursion, $60.

New Zealand. By steamer from San Francisco (Oceanic Steamship Co.).

Norfolk, Old Point Comfort, etc. By steamer, four times per week, from New York (Old Dominion Line). Passage, $8; excursion, $13.

Savannah. By steamers from New York (Ocean Steamship Co.) four times per week. Baltimore (Merchants and Miners' Transportation Co.) semi-weekly, and Boston (New England and Savannah Steamship Co.) weekly. Passage from New York, $20, excursion, $32; from Baltimore, $15; excursion, $25; from Boston, $22, excursion, $36.

St. Thomas, St. Croix, St. Vincent (See **West Indies, Lesser**).

Sandwich Islands. By steamers from San Francisco (Occidental and Oriental, and Oceanic Steamship Cos.).

United States of Columbia, Venezuela, Guiana. By steamer from New York and Brooklyn (Columbian Line) every ten days for Colon; Red "D" Line every ten days from Brooklyn, for Venezuelan ports; Knott's Prince Line, Compañía Transatlantica Española and Royal Dutch West India Mail Line, from Brooklyn.

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(*Continued from preceding page.*)

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